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THE NATIONAL GEOGRAPHIC MAGAZINE

AN ILLUSTRATED MONTHLY, published by the NATIONAL GEOGRAPHIC SOCIETY, at Washington, D. C. All editorial communications should be addressed to the Editor of the NATIONAL GEOGRAPHIC MAGAZINE, Hubbard Memorial Hall, Washington, D. C. Business communications should be addressed to the National Geographic Society, Hubbard Memorial Hall, Washington, D. C.

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CARL LOUISE GARRISON
Principal of Morgan School, Washington, D. C.

WASHINGTON, D. C.

National Geographic Society
Hubbard Memorial Hall

August 4, 1904.

Dear Sir:

The Eighth International Geographic Congress will meet in this city on September 8th, and after holding several sessions here will proceed to Philadelphia, New York, Chicago, and St. Louis, where the Congress will be entertained by the local geographic societies as set forth in the accompanying announcement.

The Congress meets in the United States on the joint invitation of the different geographic societies of this country, in which movement the National Geographic Society has taken the initiative. It is incumbent upon us, therefore, to do all that is possible to make the meeting here a success.

I therefore urge you, as a member of the National Geographic Society, to register as a member of the Congress and attend its sessions.

Please fill out the registration blank on the back of the announcement, and return, with the fee, to J. H. McCormick, Secretary Committee of Arrangememts, Hubbard Memorial Hall, Washington, D. C., by August 20th, that your name may be included in the forthcoming list of members.

Very truly yours,

HENRY GANNETT,

Acting President,

National Geographic Society.

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GENERAL ANNOUNCEMENT

EIGHTH INTERNATIONAL GEOGRAPHIC CONGRESS, WASHINGTON, 1904

HUBBARD MEMORIAL HALL,

WASHINGTON, D. C., U. S. A., *June, 1904.*

The Executive Committee of the Seventh International Geographic Congress, held in Berlin in 1899, having voted to convoke the Eighth Congress in Washington, a Committee of Arrangements was, at the instance of the National Geographic Society, organized on behalf of several geographic societies and clubs, viz :

National Geographic Society.
American Geographical Society.
Geographical Society of Philadelphia.
Geographic Society of Chicago.
Geographical Society of Baltimore.
Geographical Society of the Pacific.
Geographical Society of California.
Peary Arctic Club.
Appalachian Mountain Club.
American Alpine Club.
Mazamas.
Sierra Club.
Harvard Travelers' Club.

After issuing a brief announcement through the scientific press late in 1903, this Committee of Arrangements, in January, 1904, circulated a preliminary announcement inviting geographic societies and cognate institutions and all persons interested in any phase of geographic science to participate in the first international congress to be held in the western hemisphere in September of this year. Gratifying replies have been received; several hundred individuals and institutions have already registered as members of the Congress; a number of delegates have been appointed to represent geographic societies in different parts of the world; notice of the appointment of a number of governmental representatives has been received, while titles of nearly 200 papers have been submitted for presentation before the Congress.

The plans of the Committee of Arrangements and other committees are now sufficiently advanced to warrant the issue of this general announcement and to extend a cordial and specific invitation to all persons interested in the science of geography to become members of the Congress and participate in its proceedings.

TIMES AND PLACES OF CONVENING

After assembling informally in Washington on the evening of September 7, 1904, the Congress will formally convene on Thursday, September 8, at 10 o'clock. It will reconvene in Philadelphia on Monday, September 12, at 9 o'clock; and again in New York on Tuesday, September 13, at 10 o'clock. After a field meeting at Niagara Falls on Friday, September 16, it will reassemble in Chicago on Saturday, Sep-

tember 17, at 10 o'clock; and it will finally convene in St Louis in conjunction with the International Congress of Science and Arts, on Monday, September 19, at 10 o'clock.

For convenience the meetings will be classified as (1) General Sessions, usually held in the forenoon; (2) Sectional Meetings, usually afternoon; (3) Field Meetings; (4) Evening Lectures, and (5) Social Gatherings.

HEADQUARTERS

Until September 7 the office of the Congress will be in Hubbard Memorial Hall (the home of the National Geographic Society), corner 16th and M Streets N. W., Washington, D. C. On Wednesday, September 7, the records will be transferred to the Ebbitt House, 14th and F Streets N. W., and this hotel will remain the headquarters during the stay of the Congress in Washington, and the secretaries will be in constant attendance for registering members, supplying badges, furnishing information, etc.

On September 12 an office for registration will be opened in the headquarters of the Geographical Society of Philadelphia, 1520 Chestnut Street.

On the morning of the 13th an office for registration will be opened in New York, at the American Geographical Society building, 15 West 81st Street, which will be the headquarters of the Congress during its stay in New York.

On September 17 a registration office will be opened in Cobb Hall of the University of Chicago.

On the morning of September 19 a registration office will be located in the Hall of Congresses on the Exposition grounds in St Louis. On Saturday, September 24, the records will be retransferred to Hubbard Memorial Hall, Washington, where the office will be retained and where all correspondence should be directed before the final closing of the affairs of the Eighth International Congress.

REGISTRATION

Delegates, members, and associates, and persons desiring to become members, are requested to register on the earliest possible date at the local headquarters in the city in which they first attend the Congress. Those who participate in the Washington sessions are especially desired promptly to record their names and local addresses, in order to facilitate the preparation of lists of membership and the delivery of mail. Immediately on registering, members of the Congress will receive the official badge entitling them to the privileges of the Congress and to the courtesies extended to members by local committees.

HOTELS

In Washington the hotels recommended are as follows:

The Ebbitt House (headquarters), 14th and F Streets, American plan, $3 and $4 per day.

The New Willard, across street from the Ebbitt House (headquarters), three squares south of meeting place, European plan, $2.50 per day upward.

The Raleigh, 12th Street and Pennsylvania Avenue, European plan, $2 per day upward.

The Arlington, one block west of meeting place, American plan, $5 per day.

The Shoreham, across street from meeting place, European plan, $2 and $3 per day.

The Colonial, across street from meeting place, European plan, $1.50 per day.

Members preferring private or boarding houses to hotels can be accommodated at reasonable rates by communicating in advance with the Secretary of the Committee of Arrangements.

In New York the hotel headquarters will be in the Endicott, corner Columbus Avenue and 81st Street, where the rates (European plan) are from $1 to $3 per day.

In Chicago, Hotel Del Prado, midway

between Chicago University and Field Columbian Museum, will be found convenient; the rates (European plan) are from $1.00 to $2.50 per day. To those preferring downtown hotels, the Auditorium and the Auditorium Annex are recommended (European plan, $2.50 to $5.00 per day).

In St Louis the hotel headquarters will be the Inside Inn; the rates (European plan) are $2.50 per day, and $4.50 American plan. Persons desiring accommodations at this hotel should notify the Committee of Arrangements as soon as possible, in order to insure proper accommodations.

PROGRAM

The following general program for the Congress is proposed by the Committee of Arrangements, subject to revision by the Presidency after the first meeting in Washington:

Wednesday, September 7

Evening: Informal reception at Hubbard Memorial Hall by the National Geographic Society.

Thursday, September 8

Morning, 10 o'clock: Formal opening of the Congress, George Washington (Columbian) University Hall, 15th and H Streets.

Afternoon, 2.30 o'clock: Visits to Scientific Bureaus.

Evening, 8 o'clock: Lecture.

Friday, September 9

Morning, 10 o'clock: General session, devoted especially to governmental surveys.

Afternoon, 2.30 o'clock: Sectional meetings.

5 o'clock: Reception by Mrs Gardiner Greene Hubbard at "Twin Oaks."

Evening, 8 o'clock: Lecture by Prof. Dr Er. von Drygalski.

Saturday, September 10

Morning, 10 o'clock: Sectional meetings.

Afternoon, 2.30 o'clock: Sectional meetings.

Evening, 8 o'clock: Reception by President and Mrs. Peary.

Sunday, September 11

Members so desiring will have the opportunity of spending a few hours on an excursion boat, passing Mount Vernon and other points of geographic interest on the lower Potomac.

At 7 o'clock the Congress will take a Pennsylvania Railway train at the Sixth Street station, arriving in Philadelphia at 10 p. m.

Monday, September 12

Leaving Broad Street station at 9 o'clock, the party will be conveyed, under the guidance of members of the Geographical Society of Philadelphia, to Independence Hall. A brief visit will be made to the rooms of the American Philosophical Society, after which the party will be driven to the Free Museum of Science and Art of the University of Pennsylvania. Following an inspection of the museum, the members of the Congress will be the guests of the University at a luncheon at 1 o'clock at Houston Hall.

Preceding a field meeting in Fairmount Park, brief addresses will be made by local and other geographers. At 2.30 p. m. the foreign delegates and foreign members and associates will enter coaches and be driven through Fairmount Park and along the Wissahickon drive to the Philadelphia Country Club, where a subscription dinner will be tendered all foreign guests at 6 o'clock in the evening. The party will leave Broad Street station, in Pullman cars, for New York later in the evening.

Tuesday, September 13

Morning, 10 o'clock: General session in the lecture hall of the American Geographical Society building, 15 West Eighty-first street, devoted to oceanog-

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Tuesday, September 13

Morning, 10 o'clock: General session in the lecture hall of the American Geographical Society building, 15 West Eighty-first street, devoted to oceanog-

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raphy; introduced by an address from Sir John Murray.

1 o'clock: Buffet lunch at the American Museum of Natural History.

Afternoon, 2.30 o'clock: Sectional meetings in rooms of the American Museum of Natural History.

Evening, 8 o'clock: Public lecture.

9.15 o'clock: Reception tendered by the American Geographical Society.

Wednesday, September 14

Morning, 10 o'clock: Sectional meetings.

1 o'clock: Buffet lunch at the American Museum of Natural History.

Afternoon, 2.30 o'clock: Sectional meetings, devoted especially to commercial geography.

Evening, 8 o'clock: Subscription dinner complimentary to foreign delegates.

Thursday, September 15

At 9 o'clock the party will leave the pier at West One hundred and twenty-ninth street for an excursion up the Hudson River on the steamer *Richmond*. After passing through the lower valley and the highlands, landing will be made at Fishkill. Here trolley and elevator cars will transfer the party to the top of Mt Beacon, from which a splendid view of the Hudson Valley and bordering mountains may be obtained. Professor William Davis will conduct the field meeting on Mt Beacon.

Taking the steamer again about 4 o'clock, the party will proceed down the river to West Point, where landing will be made to visit the U. S. Military Academy. The corps of cadets will be seen in their regular afternoon exercises, closing with a dress parade.

The party will take a ferry from West Point to connect with the special train on the New York Central Railroad at 8 o'clock, while members leaving the party here will take steamer for New York at about 7 o'clock.

Lunch will be served on board the steamer before reaching Fishkill, and dinner will be served for members returning to New York after leaving West Point.

Friday, September 16

The party will arrive at Niagara Falls at 7 o'clock a. m. After an address on the geographic development of the great cataract by Mr G. K. Gilbert, there will be a general field meeting, in charge of geographers familiar with the region. The party will descend the river on the left (Canadian) side of the gorge in trolley cars to Queenstown; thence they will ferry to Lewiston, and ascend the right (American) side of the gorge past the Whirlpool Rapids, resuming the special train at 7.30 o'clock p. m.

Saturday, September 17

Morning, 8 o'clock: Arrive at Twelfth Street station, Chicago.

10 o'clock: General session at Cobb Hall.

1 o'clock: Buffet lunch at Hutchinson Hall.

Afternoon, 2.30 o'clock: Visits to various buildings of Chicago University, to Field Columbian Museum, to the Musium of Fine Arts, and to the Chicago Public Library.

Evening, 8 o'clock: Reception tendered by the Geographical Society of Chicago, at Historical Society Building.

Sunday, September 18

If desired by any considerable number of members, an opportunity will be afforded for a view of the Chicago lake front from an excursion steamer.

At 10 o'clock p. m. the party will take a special train on the Illinois Central Railway at Twelfth Street station (Twelfth Street and Michigan Boulevard) for St Louis.

Monday, September 19

Morning, 8 o'clock: Arrive at Union station; breakfast at station (Terminal Hotel), afterward taking a Wabash shuttle train to World's Fair Grounds.

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10 o'clock: Meeting with the World's Congress of Science and Arts in the Hall of Congresses, Administration Building, World's Fair.

Afternoon: Opportunity for inspection of exhibits of geographic interest (to be listed in a later program).

Tuesday, September 20

Morning, 10 o'clock: Meeting with World's Congress of Science and Arts, in the Department of Sciences of the Earth.

Evening, 8 o'clock: Lecture by the President of the Congress, Commander Robert E. Peary, U. S. N.

Wednesday, September 21

The members of the International Geographic Congress will meet in conjunction with the World's Congress, and will have special opportunities for participating in discussions.

Thursday, September 22

A formal session closing the Eighth International Geographic Congress will occur at an hour and place to be announced in later programs.

TRANSPORTATION

Transportation from Washington to New York by special train over the Pennsylvania Railroad will be $5.

Transportation has been arranged (including sleeping-car berth and meals) from New York to Chicago and St Louis at greatly reduced rates. The cost of this transportation to members, from New York to Niagara Falls, Chicago, and St Louis, the special Pullman train, will be $45. This will include, beside railway fare, sleeping-car service and meals while traveling, and breakfast and transfer to World's Fair at St Louis, and also return railway fare from St Louis to New York, including stop-over privileges in Washington, but not sleeping car and meals from St Louis to New York. Tickets are good for return passage on any regular train on Baltimore and Ohio Railroad out of St Louis.

Definite arrangements have been made for an international excursion, leaving St Louis on the evening of September 24 by a special train which will proceed over the Santa Fé lines to the terminal station and hotel on the brink of the Grand Cañon of the Colorado, *via* Williams, Arizona, and will then run *via* El Paso and the Mexican International Railway to the City of Mexico. Thence the train will return over the Mexican National Railway *via* Laredo to St Louis. The cost of this international excursion, including sleeping-car privileges and meals, will be approximately $150; time required will be 12 to 14 days.

Members desiring hotel or transportation accommodations, also those wishing to participate in the excursion, should notify the Committee of Arrangements as soon as possible in order that proper facilities may be accorded them.

Books, maps, and instruments intended for use in the Congress, also cameras, are admitted free of duty. The owner, however, must make a declaration to that effect before the customs officers at the port of entry.

MEMBERSHIP

Membership in the Congress may be acquired by members of geographic and cognate societies on payment of $5 (25 francs, 1 pound, or 20 marks); persons not members of such societies may acquire membership by a similar payment and election by the Presidency. Members will be entitled to participate in all sessions and excursions of the Congress and to attend all lectures and social meetings in honor of the Congress; they will also (whether in attendance or not) receive the publications of the Congress, including the daily program and the final *Compte Rendu*.

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Ladies and minors accompanying members may be registered as associates on payment of $2.50 (12½ francs, 10 shillings, or 10 marks); they shall enjoy all privileges of members except the rights of voting and receiving publications.

Teachers in public schools may also be registered as associates after nomination by two members and subject to the action of the Presidency, on payment of $2.50; they shall enjoy all privileges of members except the rights of voting and receiving publications.

Pending the opening of the Congress, subscriptions will be received by the Committee of Arrangements, and members and associates tickets will be either mailed to subscribers or held for delivery on registration; during and after September 8 subscriptions will be received and tickets will be issued at the official headquarters under the direction of the Presidency.

Geographers and their friends desirous of attending the Congress or receiving its publications are particularly requested to signify their intention at the earliest practicable date, in order that ticket certificates as members or associates may reach them safely; the privileges of the Congress, including the excursions and social gatherings, can be extended only to holders of tickets.

SOCIETIES AND DELEGATES

It is hoped that the Eighth International Geographic Congress may be an assemblage of geographic and cognate institutions no less than of individual geographers; and to this end a special invitation has been extended to such organizations to participate in the Congress through delegates on the basis of one for each one hundred members up to a maximum of ten. No charge will be made for the registration of institutions, though the delegates will be expected to subscribe as members; and in order that the list of affiliated institutions may be worthy of full confidence, the Committee of Arrangements reserve the right to withhold the name of any institution pending nomination by the Presidency. The publications of the Congress will be sent free to all institutions registered. In order that the geographic societies of the Western Hemisphere may fully utilize the opportunity afforded by this Congress for establishing closer relations with those of the old world, Spanish will be recognized as one of the languages of the Congress, together with French, English, German, and Italian, in accordance with previous usage; a communication before the Congress may be written in one (or more) of these languages.

Scientific societies not strictly geographic in character, public libraries, universities, academies of science, and cognate institutions are invited to subscribe to the Congress on the basis of membership; they will then receive certificates, their names will appear in the published lists of members, and they will receive all publications of the Congress (including daily programs and the *Compte Rendu* as issued).

COMMUNICATIONS

The subjects for treatment and discussion in the Congress have been classified as follows:

1. Physical geography, including geomorphology, meteorology, hydrology, etc.
2. Mathematical geography, including geodesy and geophysics.
3. Biogeography, including botany and zoölogy in their geographic aspects.
4. Anthropogeography, including ethnology.
5. Descriptive geography, including explorations and surveys.
6. Geographic technology, including cartography, bibliography, etc.
7. Commercial and industrial geography.

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8. History and geography.
9. Geographic education.

A special opportunity will be afforded for the discussion of methods for surveying and map-making and for comparison of these methods as pursued in other countries with the work of federal and state surveys maintained in this country.

Delegates and members desiring to present communications before the Congress or wishing to propose subjects for discussion are requested to signify their wishes at the earliest practicable date. A list of titles of communications already offered is appended. It is especially needful that any titles offered hereafter shall be accompanied by abstracts (not exceeding 300 words in length) in order that the Presidency may take prompt action toward introducing the titles and abstracts in the general program to be published at the beginning of the Congress.

The time required for presenting communications should be stated; otherwise twelve minutes will be allotted. It is anticipated that not more than twenty minutes can be allotted for any communication unless the Presidency decide to extend the time by reason of the general interest or importance of the subject.

Titles and abstracts of communications may be submitted either through the Committee of Arrangements or directly to the Chairman of the Committee on Scientific Program. Pending the opening of the Congress, this committee shall decide whether the same are appropriate for incorporation in the program, though the decisions of the committee shall be subject to revision by the Presidency after the Congress convenes.

The preliminary announcement, issued in January last, having provided that proposals affecting the organization of the Congress should be submitted in writing before May 1, any such proposals hereafter received will be laid before the Presidency, who will determine whether they shall receive consideration at the Eighth Congress or be laid over for future action.

PROGRAMS

The General Program, comprising titles and abstracts of communications, sectional assignments, announcements of general, sectional, and social meetings, etc., will be published on or about September 7. All titles, abstracts, etc., designed for incorporation in this program must be in the hands of the Committee of Arrangements not later than August 1, 1904.

Daily programs will be issued during the meetings in Washington and New York. Any matter designed for incorporation in these must be in the hands of the secretaries by six o'clock of the day preceding issue.

COMPTE RENDU

The Presidency, with the aid of a Committee on Publication, will prepare a volume of proceedings or *Compte Rendu*, comprising those communications and abstracts which they deem it needful to publish; and this publication will be sent to all members of the Congress, including societies represented by delegates.

All communications and abstracts submitted for reading or printing shall be deemed the property of the Congress, and in every respect subject to the action of the Presidency, although a request for the return of any copy not approved for publication might be entertained at the option of the Presidency.

Authors of communications exceeding seven (printed) pages in length desiring separates shall order the same (specifying the number) in writing on their manuscript. Such separates will be furnished at cost of press work, paper, and cover, plus a small percentage (not exceeding twenty-five).

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EXHIBITS

No exhibits will be arranged directly by the Congress. Opportunities for inspecting actual geographic work—*e. g.*, map-making, etc.—will be afforded especially in Washington in the offices and laboratories of the U. S. Geological Survey, the U. S. Coast and Geodetic Survey, and the U. S. Weather Bureau.

Opportunities will also be afforded for inspecting the exhibits of geographic character at the Louisiana Purchase Exposition in St Louis.

Publishers and other parties may make appropriate exhibits in connection with the Congress on approval of the Committee of Arrangements or the Presidency.

CORRESPONDENCE

Correspondence relating to the Congress before, during, and after the sessions herein announced, and all remittances, should be directed to

THE EIGHTH INTERNATIONAL
GEOGRAPHIC CONGRESS,
Hubbard Memorial Hall,
Washington, D. C., U. S. A.

ORGANIZATION

Honorary President

The President of the United States

President of the Congress

Commander Robert E. Peary, U. S. N.

Honorary Vice-Presidents

Their Excellencies:
The Russian Ambassador.
The Mexican Ambassador.
The Italian Ambassador.
The Ambassador from Austria-Hungary.
The Ambassador from France.
The German Ambassador.
The Ambassador from Great Britain.
The Minister from Sweden and Norway.
The Minister from Guatemala.
The Minister from Denmark.
The Minister from Haiti.
The Minister from Brazil.
The Minister from Costa Rica.
The Minister from Nicaragua.
The Minister from Japan.
The Peruvian Minister.
The Minister from Argentina.
The Belgian Minister.
The Minister from Siam.
The Chilian Minister.
The Minister from Colombia.
The Minister from Portugal.
The Minister from Cuba.
The Minister from Spain.
The Minister from Salvador.
The Minister from Ecuador.
The Minister from Switzerland.
The Minister from China.
The Minister from Uruguay.
The Minister from Paraguay.
The Minister from The Netherlands.
The Bolivian Minister.
The Minister from Panama.
The Minister from Turkey.
The Minister from Persia.
The Minister from the Dominican Republic
The Minister from Korea.
The Venezuelan Minister.

Honorary Vice-Presidents—Continued.

Presidents of Previous International Congresses

Duca di Sermoneta (Venice, 1881).

Nationalrath Doctor Gobat (Bern, 1891).

Sir Clements R. Markham (London, 1895).

Ferdinand Freiherr von Richthofen (Berlin, 1899).

Presiding Officers Chosen by Host Societies

—— —— (National Geographic Society).

—— —— (Geographical Society of Philadelphia).

—— —— (American Geographical Society).

—— —— (Geographic Society of Chicago).

General Secretary

Henry Gannett.

Assistant Secretary

George B. Shattuck.

Treasurer

John Joy Edson.

Committee of Arrangements

W J McGee, National Geographic Society, Chairman.

Henry G. Bryant, Geographical Society of Philadelphia.

George B. Shattuck, Geographical Society of Baltimore.

A. Lawrence Rotch, Appalachian Mountain Club, Boston.

Zonia Baber, Geographic Society of Chicago.

George Davidson, Geographical Society of the Pacific, San Francisco.

Frederick W. D'Evelyn, Geographical Society of California, San Francisco.

John Muir, Sierra Club, San Francisco.

Rodney L. Glisan, Mazamas, Portland.

Angelo Heilprin, American Alpine Club.

Herbert L. Bridgman, Peary Arctic Club.

William Morris Davis, Harvard Travelers' Club.

J. H. McCormick, Secretary.

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Titles of Papers Offered to June 1, 1904

(Arranged by Topics)

NOTE.—Authors of papers will kindly examine the titles announced in this preliminary program. If they are not satisfactory in any way, kindly notify the Secretary of the Committee on Scientific Program at the earliest possible moment.

All letters upon this subject should be addressed as follows:

Professor William Libbey,
Princeton, New Jersey,
U. S. A.

I. PHYSIOGRAPHY

1. PHYSIOGRAPHY OF THE LAND

1. Physiography of the Archean Areas of Canada
   Prof. A. W. G. Wilson,
   Montreal, Canada.
2. Gorges and Waterfalls of Central New York.
   Prof. R. S. Tarr, Ithaca, N. Y.
3. Physical History of Cape Cod.
   Prof. W. H. Niles, Boston, Mass.
4. Sur la Relief des Karpates meridionales.
   Prof. Emmanuel de Martonne,
   Rennes, France.
5. Geography of Mt Shasta and the Yosemite.
   Mark B. Kerr, C. E., Stent, Cal.
6. Physiographical Sketch of the Adirondack Region.
   Prof. J. F. Kemp, New York City.
7. Island Tying.
   F. P. Gulliver, Ph. D.,
   Southboro, Mass.
8. The Complications of the Geographical Cycle.
   Prof. W. M. Davis, Cambridge, Mass.
9. The Bearing of Physiography on Suess' Theories.
   Prof. W. M. Davis, Cambridge, Mass.
10. Some Geologic Data in the Geography of the Mississippi River.
    Prof. C. W. Hall, Minneapolis, Minn.
11. Deflection of Michigan Rivers by Terrestrial Rotation.
    Prof. M. S. A. Jefferson,
    Ypsilanti, Mich.
12. Scientific Exploration of Caves.
    Prof. E. A. Martel (absent),
    Paris, France.
13. (Title later.)
    Prof. A. Penck, Vienna, Austria.
14. Classification of Mountains.
    Prof. W. N. Rice, Middletown, Ct.
15. Glacial Erosion in the Finger Lake Region of New York.
    M. R. Campbell, Washington, D. C.
16. The Sculpture of Massive Rocks.
    G. K. Gilbert, Washington, D. C.

2. METEOROLOGY

1. The Climate of Guam as Revealed by Meteorologic Observations on the Island during the Year 1902.
   Cleveland Abbe, Jr., Ph. D.,
   Washington, D. C.
2. A Climatological Dictionary for the United States.
   Prof. A. J. Henry, Washington, D. C.
3. The Scientific Work of the Mount Weather Meteorological Research Observatory.
   Prof. F. H. Bigelow, Washington, D.C.
4. Suggestions Concerning a More Rational Treatment of Climatology.
   Prof. R. DeC. Ward, Cambridge, Mass.
5. The Climate of Canada.
   Prof. R. F. Stupart, Ottawa, Canada.
6. The Climate of Kimberley.
   J. R. Sutton (absent),
   Kimberley, South Africa.
7. Non-periodic Variations of the Atmospheric Circulation in the Region of the North Atlantic Ocean.
   Dr W. Meinardus, Berlin, Germany.
8. The Principles of Graphical Climatology.
   Dr K. Kassner, Prussian Meteorological Institute.
9. Antarctic Meteorology and International Coöperation in Polar Work.
   Henryk Arctowski, Brussels, Belgium.

3. OCEANOGRAPHY

1. Currents and Climatology of the North Pacific.
   Prof. G. Davidson, San Francisco, Cal.
2. Co-tidal Lines for the World.
   Prof. R. A. Harris, Washington, D. C.
3. European Polar Sea Investigations.
   Prof. Knipowitsch,
   St Petersburg, Russia.
4. Deep Sea Deposits.
   Sir John Murray,
   Edinburgh, Scotland.
5. New Theory of Tidal Undulations in Oceanography.
   O. T. Olsen, Grimsby, England.
6. Border Seas of Japan.
   Prof. J. J. Rein, Bonn, Germany.
7. Physical Character and History of the Baltic.
   Prof. J. J. Rein, Bonn, Germany.
8. Evidence of Land Near the North Pole.
   Prof. R. A. Harris, Washington, D. C.
9. Fifty Years in Oceanography.
   Prof. A. Lindenkohl,
   Washington, D. C.
10. Strömungen der luft und des Wassers.
    Prof. E. Witte, Brieg, Germany.
11. Temperature Charts of the Azores.
    Prof. J. Thoulet, Nancy, France.
12. La Methode Graphique en oceanographie.
    Prof. J. Thoulet, Nancy, France.
13. Les travaux oceanographiques du laboratoire de Nancy.
    Professor Thoulet, Nancy, France.
14. Oceanographic Instruments.
    Lord Kelvin (absent),
    Glasgow, Scotland.
15. Canadian Tidal Observations.
    Prof. W. B. Dawson (absent),
    Ottawa, Canada.

4. VOLCANOES

1. Hawaiian Geography.
   Prof. C. H. Hitchcock, Hanover, N. H.
2. The Destruction of Pompeii as Interpreted by the Volcanic Eruptions of Martinique.
   Prof. A. Heilprin, Philadelphia, Pa.
3. The Tower of Mt Pelée.
   Prof. A. Heilprin, Philadelphia, Pa.
4. The Volcanoes of Martinique, Guadeloupe, and Saba.
   Dr E. O. Hovey, New York City.
5. The Volcanoes of St Vincent, St Kitts, and St Eustatius.
   Dr E. O. Hovey, New York City.
6. Sur les characteres speciaux de la repartition de la Mediterranie.
   Paul Vidal de la Blache, Paris, France.

5. EARTHQUAKES

1. Relations de la figure du globe avec la distribution des volcans et tremblements de terre.
   Prof. G. Lallemand (absent),
   Paris, France.
2. The Seismical Distribution and Tectonic Connections of Earthquakes in the United States of North America.
   Count de Montessus de Ballore
   (absent), Abbeville, France.
3. Ergebnisse der modernen erdbebenforschung.
   Prof. E. Rudolph (doubtful),
   Strassburg, Germany.
4. Submarine erdbeben und eruptionen.
   Prof. E. Rudolph (doubtful),
   Strassburg, Germany.
5. Vertikale bodenbewegungen beobachtet mit dem trifilargravimeter.
   Prof. A. Schmidt, Stuttgart, Germany.
6. The Energy of Large Earthquakes in Absolute Measure.
   Prof. de Kovesligethy,
   Budapest, Hungary.
7. A New Geometrical Theory of Earthquakes and the Absorption of Earthquakes' Energy by the Earth.
   Prof. de Kovesligethy,
   Budapest, Hungary.
8. Die Internationale Seismologische Staaten Association.
   Dr G. Gerland, Strassburg, Germany.
9. Uber die moderne Seismologie.
   Dr G. Gerland, Strassburg, Germany.

6. GLACIERS

1. Glaciers of British Columbia.
   G. Vaux, Jr., Philadelphia, Pa.
2. The Lewis Range of Northern Montana and its Glaciers.
   F. E. Matthes, Washington, D. C.
3. The Jostedalbræ in Norway.
   Prof. M. Ebeling (absent),
   Berlin, Germany.
4. Glacial Lakes and Pleistocene Changes in the St Lawrence Valley.
   Prof. A. P. Coleman, Toronto, Canada.
5. Studies of the Snow Region of the High Mountains of Northern Sweden.
   Dr Axel Hamberg,
   Stockholm, Sweden.
6. The Reservoir Lag in Glacier Variations.
   Prof. H. F. Reid, Baltimore, Md.
7. The Glaciers of Mt Hood and Mt Adams.
   Prof. H. F. Reid, Baltimore, Md.
8. Chatter-marks or Crescentic Sub-Glacial Fractures.
   Prof. G. K. Gilbert, Washington, D. C.
9. The Antarctic Glaciers.
   Henryk Arctowski, Brussels, Belgium.

7. MAGNETICS

1. The Magnetic Disturbances During the Eruption of Mt Pelée on May 8, 1902.
   Prof. L. A. Bauer, Washington, D. C.
2. Our Knowledge of the Distribution of the Earth's Magnetism Over the Ocean Areas.
   Prof. L. A. Bauer, Washington, D. C.
3. Magnetic Work of the Navy Department.
   Prof. G. W. Littlehales, Washington, D. C.

II. MATHEMATICAL GEOGRAPHY

GEODESY

1. Recent Practice in the Coast and Geodetic Survey in Triangulation, Base Measurements, and Levelling.
   Prof. J. F. Hayford, Washington, D. C.
2. The Form of the Geoid as Determined by Measures in the United States.
   Prof. J. F. Hayford, Washington, D. C.
3. Photographic Methods Employed by the Canadian Survey.
   Arthur G. Wheeler, Calgary, Canada.
4. Recent Development in the Determination of Geographical Positions.
   Dr Adolf Marcuse, Gr. Lichterfelde, Germany.

III. BIOGEOGRAPHY

1. BOTANICAL

1. The Remarkable Colony of Northern Plants along the Apalachicola River, Florida, and its Significance.
   H. Cowles.
2. The Importance of the Physiographic Standpoint in Plant Geography.
   H. Cowles.
3. La Cartographie de Geographie Botanique.
   C. Flahault, Montpellier, France.
4. Method of Determining the Age of the Different Floristic Elements in the Eastern United States.
   Prof. J. W. Harshberger, Philadelphia, Pa.
5. Mitteilungen uber den fortschritt der pflanzengeographischen Kartographie und die sich daran anschliessende nomenclatur pflanzengeographischer formationen.
   Dr Oskar Drude, Dresden, Germany.
6. Zur Dynamik der Sinlsstoffe.
   T. Christen, Bern Switzerland.

2. ZOÖLOGICAL

1. Origin of Fresh-water Faunas.
   Dr T. Gill, Washington, D. C.
2. World-wide Distribution of Deep Sea Faunas.
   Dr A. E. Ortmann, Pittsburg, Pa.
3. Repartition geographique des Animaux.
   G. Grandidier, Paris, France.
4. (Title later.)
   H. A. Pilsbry, Philadelphia, Pa.
5. The Dispersal Centers of North American Fauna.
   Charles C. Adams, Ann Harbor, Mich.
6. Zoölogical Evidence of the Former Connection of South America and Africa.
   Prof. A. S. Packard, Providence, R. I.
7. The Establishment of game refuges in the United States Forest Reserves.
   A. Sampson, Haverford, Pa.

IV. ANTHROPOGEOGRAPHY.

1. Pigmy Tribes of Africa and Their Distribution.
   S. P. Verner.
2. The Ainu, Aborigines of Japan.
   Prof. F. Starr, Chicago, Ill.
3. Entstehungsbedingungen des menschen.
   L. Chalikiopoulos, Brighton, England.
4. Race Types and Peoples Assembled at the Louisiana Purchase Exposition.
   Prof. W J McGee, Washington, D. C.
5. Correlation Between Ethnic Types and Environment.
   Prof. W J McGee, Washington, D. C.
6. Emphasis on Anthropogeography in the School.
   Miss E. C. Semple, Louisville, Ky.

V. EXPLORATION

1. AFRICA

1. Physical Characteristics of the Kasai Valley, Africa.
   S. P. Verner.
2. Africa between the River Jub and the Nile.
   A. Donaldson Smith, Philadelphia, Pa.
3. Results of the Mission to the Mobangi Shari
   A. Chevalier, Paris, France.
4. Madagascar before the French Occupation and Today.
   G. Grandidier, Paris, France.
5. Recent Researches by the French in the Sahara, and Methods of Desert Travel They Have Introduced.
   C. Rabot, Paris, France.

2. ARCTIC REGIONS

1. Desirability of Further Investigations on the Northwest Passage.
   A. J. Stone, New York City.
2. Verlauf und Ergebnisse der Deutschen Sudpolar Expedition.
   Prof. E. von Drygalski, Berlin, Germany.

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3. The Antarctic.
Dr H. R. Mill, London, England.
4. The Physical Geography of the Antarctic.
Prof. N. C. G. Nordenskjold,
Stockholm, Sweden.
5. The First American Arctic Expedition.
H. G. Bryant, Philadelphia, Pa.
6. A Comparative View of the Arctic and Antarctic.
Dr F. A. Cook, Brooklyn, N. Y.
7. Cruise of the *Belgica* (possibly).
Dr F. A. Cook, Brooklyn, N. Y.

3. ASIATIC

1. Besults of the Philippine Census.
Henry Gannett, Washington, D. C.
2. Ergebnisse einer Forschungsreise den centralen Tein-schan und Dsungarischen Ala-tau, in Jahre 1902.
Dr M. Friederichsen,
Gottingen, Germany.
3. Geographical Progress in the Dutch East Indies.
Prof. C. M. Kan, Amsterdam, Holland.
4. First Exploration of the Hoh Lumba Glaciers and Sorbon. Two Record Ascents in the Himalayas.
Mrs Fanny Bullock Workman,
Worcester, Mass.
5. The Moraine of the Great Chogo Lungma Glacier, Baltistan Northwest Himalayas.
Dr William Hunter Workman,
Worcester, Mass.
6. The Scientific Results of the Russian Expedition to Kham.
Capt. P. K Kozloff (absent), St Petersburg, Russia.
7. Turkestan and Tibet.
Oscar T. Crosby, Washington, D. C.

4. AMERICA

1. The Geographical Work of the Geological Survey of New Jersey.
Prof. H. B. Kummel, Trenton, N. J.
2. First Ascents and Altitude Determination in the Canadian Alps.
Prof. H. A. Parker, New York City.
3. Results of a Journey Around Mt McKinley.
Dr F. A. Cook, Brooklyn, N. Y.
4. The Geography of Alaska.
Dr A. H. Brooks, Washington, D. C.
5. Recent Explorations in British America.
Dr R. Bell, Ottawa, Canada.
6. Grundzuge des Geologischer Aufbaus von Mittelamerika.
Dr K. Sapper (absent),
Wurtemberg, Germany.
7. The Physical and Economic Geography of Mexico.
Robert T. Hill, Washington, D. C.
8. A Crossing of South America by the Route of Pizarro and Orellana.
Dr A. Hamilton Rice, Boston, Mass.

5. GENERAL

1. Contributions to Geographical Science by the Carnegie Institute of Washington.
President D. C. Gilman,
Washington, D. C.
2. Present Status of Discovery and Future Problems of Geographical Exploration in South America.
Dr Wilhelm Sievers, Giesen, Germany.

VI. TECHNIQUE

1. Mother Maps of the United States.
Henry Gannett, Washington, D. C.
2. Application du systeme decimal à la mesure des Angles.
J. de Ray Pailhade, Toulouse, France.
3. Berichterstattung uber die Internationale Abkurzung von Titeln Geographischer Zeitschriften.
O. Baschin, Berlin, Germany.
4. Modern Hydrographical Methods.
Prof. M. Knudsen (absent),
Copenhagen, Denmark.
5. Principles of Geographic Relief.
George C. Curtis, Boston, Mass.
6. Hydrologic Works of the Geological Survey in the Eastern United States.
Myron L. Fuller, Washington, D. C.
7. The Chronometer and Time Service of the U. S. Naval Observatory and the Present Status of Standard Time.
Lt. Comdr. Edward Everett Hayden,
Washington, D. C.

VII. ECONOMIC

1. The Relations of Commerce to Geography.
O. P. Austin, Washington, D. C.
2. La Valeur economique de la Suisse.
A. de Claparede, Geneva, Switzerland.
3. La Geographie economique et sociale au XX Siecle.
A. de Claparede, Geneva, Switzerland.
4. Geographical Development of the Internal Commerce of the United States.
Dr J. F. Crowell, Washington, D. C.
5. Die entwickelung der Deutschen Kolonien in Brasilien.
Dr A. Funke, Berlin, Germany.
6. La Development de la Geographie economique depuis trente aus; magnifiques resultats obtenus et a obtenir encore.
C. Gauthiot, Paris, France.
7. The Extent and Efficiency of Governmental Promotion of Commerce in the Leading Countries.
Prof. E. R. Johnson, Philadelphia, Pa.

8. Rise and Development of the German Colonial Possessions.
   Graf Joachim v. Pfeil u Klein Ellguth, Lauban, Germany.
9. The Economic Importance of the Plateaus in Tropical America.
   Prof. J. R. Smith, Philadelphia, Pa.
10. Hydrography and Economics of the Nile Basin.
    Sir W. Willcocks, Cairo, Egypt.
11. Geographic Aspects of Commercial Museums.
    W. P. Wilson, Sc. D., Philadelphia, Pa.
12. Geographical Influences Affecting the Development of the Sugar Beet Industry in the United States.
    Dr H. C. Taylor, Madison, Wis.
13. The Atlantic Ferry.
    Capt. B. J. Kennelly, London, England.
14. Colonial Development in British Tropical Africa.
    Sir H. H. Johnston, London, England.
15. Oceanic Fishing Grounds.
    Capt. R. Dittmer, Hannover, Germany.
16. The Division of the Industrial Forces in France by Departments.
    Prof. E. Levasseur, Paris, France.
17. The Caribbean Regions and Their Resources.
    Francis C. Nicholas, New York City.
18. Game and Fur Bearing Animals and Their Influence on the Indian of the Northwest.
    Dr T. W. Thorndike, Boston, Mass.
19. La vateur commerciale et industrielle du Sahara français.
    Prof. E. T. Gautier, Algiers.
20. L'error economique de l'amerique, jugè du vieux continent.
    Georges Blondel, Paris, France.

VIII. HISTORICAL

1. Ancient Oceanography.
   Prof. Guido Cora, Rome, Italy.
2. History and Economic Development of Saint Anthonys Falls.
   Prof. C. W. Hall, Minneapolis, Minn.
3. The Cabot Landfall.
   G. R. F. Prowse, Philadelphia, Pa.
4. North American as Known in 1804 and 1904.
   Gilbert H. Grosvenor, Washington, D. C.
5. Ancient Italian Maritime Itineraries.
   Prof. F. P. Garofalo, Naples, Italy.
6. Some Early Geographers of the United States.
   Rear Admiral C. M. Chester, Washington, D. C.
7. (Title later.)
   Prof. E. L. Stevenson, New Brunswick, N. J.
8. Des Chretiens de Saint Mathieu existant en Afrique au commencement du 14me Siecle et de l'identification a l'Ouganda de l'empire Chretien de Magdasor.
   Frederic Romanet du Gaillaud, Haute, Vienne, France.

IX. EDUCATIONAL

1. College Entrance Examinations in Geography.
   Prof. W. M. Davis, Cambridge, Mass.
2. Geographical Excursions for Children.
   Miss Zonia Baber, Chicago, Ill.
3. Geography and History in the United States.
   Prof. A. P. Brigham, Hamilton, N. Y.
4. Observational Work for Children.
   F. Carney, Ithaca, N. Y.
5. Geography in the Normal Schools of the United States.
   Prof. C. R. Dryer, Terre Haute, Ind.
6. Die Bestrebungen der Culturnationen sur Hebung des Geographischen Schulunterrichts und ihre Beforderung durch internationalen Nachrichten Austausch.
   H. Fischer, Berlin, Germany.
7. School Geography in the United States.
   Dr Martha K. Genthe, Hartford, Ct.
8. Mathematical Geography for Teachers.
   Prof. J. P. Goode, Chicago, Ill.
9. Economic Geography in Secondary Schools.
   Prof. C. A. Herrick, Philadelphia, Pa.
10. Geographic Influence: A Field for Investigation.
    G. D. Hubbard, Ithaca, N. Y.
11. How to Make Geography Real to Students.
    Prof. M. S. A. Jefferson, Ypsilanti, Mich.
12. The Treatment of Economics in the Study of Commercial Geography.
    Prof. E. C. Jones, Ann Harbor, Mich.
13. Recent Progress of Geography in England.
    Dr J. Scott-Keltie, London, England.
14. Summer Schools in Geography.
    Prof. E. M. Lehnert, Winona, Minn.
15. Physiography in Universities.
    Prof. C. F. Marhut, Columbia, Mo.
16. Excursions in College Geography.
    Prof. W. H. Norton, Mt Vernon, Ia.
17. Physical Geography in High Schools.
    Miss M. I. Platt, Brookline, Mass.
18. Geographical Research.
    Miss E. C. Semple, Louisville, Ky.
19. Geographical Laboratories.
    W. H. Snyder, Worcester, Mass.
20. Practical Work in School Geography.
    R. H. Whitbeck, Trenton, N. J.
21. Educational Geography in the Western States.
    H. W. Fairbanks (absent), Berkeley, Cal.
22. Town Plans and Geography of Towns.
    Dr Eugen Oberhummer, Vienna, Austria.

To the

Eighth International Geographic Congress

HUBBARD MEMORIAL HALL

WASHINGTON, D. C., U. S. A.

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VOL. XV, No. 8 WASHINGTON AUGUST, 1904

THE NATIONAL GEOGRAPHIC MAGAZINE

PERU—ITS RESOURCES, DEVELOPMENT, AND FUTURE*

BY ALFREDO ALVAREZ CALDERON, OF THE PERUVIAN LEGATION

PERU is about three and one-third times as large as Germany, twice as large as France, nearly three times as large as Texas, and 14 times larger than the State of New York.

The population of this immense territory is about 3,000,000—equivalent to 4.1 inhabitants per square mile. How small this ratio is when compared with some of the European countries may be seen in the following table:

Name of country.	Population per square mile.
Peru	4.1
Sweden	30
Russia in Europe	51
Spain	97
Portugal	151
France	188
Germany	270
Italy	294
Great Britain and Ireland	346
Netherlands	416
Belgium	589

Peru contains a vast sparsely populated territory, greater than that of any European country, Russia excepted, and capable of containing many more millions of inhabitants, who would find a land rich in agicultural and mineral products, and where there is unlimited scope for those who will make their homes there.

The population of the coast might be fairly estimated at 750,000 inhabitants. The white race is the most largely distributed along this zone, and constitutes the main element of progress and wealth in the country. The city of Lima alone contains a large number of foreigners. The bulk of the population, however, resides in the highlands or Sierra, and is composed of 2,000,000 of the native Indian race, descendants of the noble Incas. The climate of this region is the most healthful in the world and is the cause of the strong and healthy constitution of the Cholo or Indian. These are of a light-colored skin, and are mainly employed in the mining exploitations as laborers, and are also proprietors of small tracts of land, which they cultivate independently.

The opinions contained in the following quotations admirably picture the characteristics of the people.

*An address before the National Geographic Society, March, 1904.

The Encyclopædia Britannica describes the Peruvians as "courteous and hospitable."

The author of a description of the voyage round the world by the French vessel *La Junon* says: "Although we were everywhere received with great kindness, nowhere did we meet with so much good will as in Peru."

An English naval officer, writing of the hospitality shown in the south of Peru, says: "Here, if possible, it surpassed that shown us in the north, and this hospitality was from people we had never seen before, and most probably would never see again, and without a chance of ever returning their kindness."

M. Marcel Monnier, the author of "Des Andes Au Para," writing of Peruvian hospitality, says: "May I be permitted at the commencement of this book to address a souvenir to those whose sympathies aided me upon my hazardous journey. They are far away, many of them can never decipher these lines, and I have little chance of seeing them again, but if ever one of these loose sheets should find its way across the sea, I would that it should bear the expression of my gratitude to friends left upon that Peruvian soil whose hospitality was so sweet to me. Everywhere I received it, upon the coast, as in the Sierra, in the rich or in the modest 'hacienda,' at the home of the humble priest, in the 'tienda' of the merchant, in the mud hut of the poor Indian."

Sir Clements Markham says: "The country gentlemen of the Peruvian coast, as a class, are remarkable for their attention to their estates, and for the charity and benevolence they display both to their own dependents and to strangers. The unbounded hospitality, indeed, of all those who made me, an unknown and solitary stranger, often without a letter of introduction, their welcome guest, far exceeded anything I had ever experienced or heard of before."

Peru is situated on the west side of South America, between the parallels of 1½° north latitude and 19° south, and between the meridians of 64½° and 83½° west of Greenwich. It is bounded on the north by the Republic of Ecuador, on the northeast by the Republic of Colombia, and on the east by the United States of Brazil, on the southeast by the Republic of Bolivia, on the south by Chile, and on the west by the Pacific Ocean.

The country is physically divided into three well defined zones—the coast or low land bordering the Pacific, the Sierra or highlands forming the Andean region, and the Montaña or forest region.

The width of the coast lands varies between 62 and 93 miles.

The greatest blessing that nature has bestowed on Peru is the three ranges of mountains traversing the country from south to north, with an average altitude of 15,000 feet above sea level. They are not only beautiful for their abruptness and majesty, but are the reason of the delightful temperature prevailing on the coast; they provide us with all the climates of the world and products of the world; they contain incalculable mineral wealth and are the sources of all the streams that descending westward irrigate the fertile valleys of the coast, and of the immense net of navigable rivers going eastward that will in the near future constitute the highways through which the numberless products of the forest region will reach the markets of the world. Yet these mountains, by their abruptness and granite formation, by their numerous crevasses and precipices, present enormous difficulties for the building of railroads or ordinary roads.

Owing to their varying altitudes and climatic conditions, the three zones of Peru differ very widely in their charac-

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teristics and products, and this constitutes for the country the basis of much of her commerce at home and abroad.

In his work on Peru, Sir Clements Markham says: "This beautiful country, embracing every description and variety of climate and scenery, producing, or capable of producing, in abundance every kind of vegetable that is known in the world, yielding from its mines rich stores of gold, silver, copper, lead, tin, coal, and mercury, and from its herds and flocks an endless supply of hides and fleeces of silky texture, is divided into three very distinct and well defined regions."

(1) "The coast, extending from the foot of the Maritime Cordillera to the ocean, contains numerous successions of rich and fertile valleys, separated from each other by sandy deserts. These valleys enjoy a warm though not oppressive climate. Rain is never known to fall, but refreshing dews descend in abundance during the night. In these fields immense crops of sugar and cotton are raised, while extensive vineyards produce wines of delicious flavor, and a spirit called aguardiente or grape whisky, which is consumed in great quantities by all classes and also exported."

(2) "The Sierra, including the puna or tableland, the region of the Cordillera of the Andes, is about 300 miles wide, and contains the most stupendous mountains, whose scenery is unequalled in beauty, vast plains and pasture lands, and warm and fertile ravines and valleys. The Sierra is the native place of the potato, the abode of the vicuña and alpaca, while in its recesses lie concealed the far-famed and inexhaustible treasures of Peru."

(3) "Montaña or tropical forests, skirting the eastern slopes of the Andes and extending over two-thirds of the Republic of Peru, are comparatively unknown, but they abound in products of the greatest commercial value, and will in some future time be the principal source of Peruvian wealth."

It might be inferred from the situation of Peru in the torrid zone that the climate would be warm throughout the country; but, owing to differences of elevation and the ruggedness of surface, every climate is enjoyed, and a settler may suit his taste to a nicety in choosing his location, whether his intention be to engage in agriculture, in manufacture, or in mining. Notwithstanding its tropical position, the country is healthful and free from those dangerous epidemics and diseases which generally prevail in the torrid zone. The coast, because of being a low land, should, according to its latitude, be exceedingly warm, yet three important factors neutralize the heat: first, the proximity to the Andes, with their perpetual ice; second, the Humboldt Stream that, coming from the South Pole with icy water, washes the coast of Peru, and, third, the cool, refreshing breezes from the south that blow all the year round. It is curious enough that in a tropical latitude, and even during the summer months, it should be almost impossible to bathe in some spots of the coast where the Humboldt Stream is particularly felt. The oval shape of the southern coast is due to the constant washing by this stream, which is named after the famous German scientist and explorer, who discovered it and explained its metereological effect on the western Pacific coast of South America.

On the coast the sun is rarely hidden by clouds, and rain seldom falls. Its general physical aspect is that of a sandy desert, except where irrigation by the streams that descend the Andean slopes have turned the desert into fertile valleys. These streams, dry during the winter months, and then often utilized as roads, become flooded with red muddy water during the thaw and rainy season on the Andean plateau.

The convenience of differences of altitude is apparent. Those who are not

satisfied with the climate of the coast, and desire cooler or even cold weather, have but to ascend the roads leading toward the Andes, the heat, of course, diminishing gradually as the higher altitudes are reached. On the Sierra it is as cool as in the south of England, on the coast it is as warm as in the south of France, and it is not very much warmer on the Montaña, while on the Puna or high plateaus it is as cold as in northern Scotland. The following table gives the mean annual temperature of the three zones at three different points:

COAST:		
Piura	77°	Fahr.
Lima	66°	"
Moquegua	63°	"
SIERRA:		
Cajamarca	52°	"
Huaraz	59°	"
Arequipa	57°	"
MONTAÑA:		
Iquitos	75°	"
Huánuco	74°	"
Santa Ana	72°	"

The Sierra is subject to rain in the summer and snow in the winter. Sir Clements R. Markham, writing on a typical Sierra town, says:

"From Cerro de Pasco there is a considerable descent southwards to the city of Jauja, the climate of which is said to be almost perfect for patients with pulmonary complaints. It is a charming little Sierra town, beautifully situated in an amphitheater of mountains, clothed to their summits with waving fields of barley The climate is delightful."

This important problem of the cure of consumption, which today so greatly preoccupies the attention of scientists, has been to a great extent solved in Peru, where doctors are unanimous in recommending a sojourn at Jauja to all those whose lungs are not sound. The construction of a sanatorium in the town of Jauja is projected.

In the Montaña there are two seasons—the dry, which lasts from May to October, and the wet, from November to April.

Professor Orton, speaking of a Montaña town, says:

"The city of Moyobamba stands in a most luxuriant place, with an altitude of about 2,700 feet and a mean annual temperature of 77° Fahr. The climate is delightful. Nature is so prodigal that everybody can get a living—except physicians."

Mr. Nötzli, M. E., writing of the same district, says:

"I have lived fifteen years in Cajamarca and in the Amazon provinces. The country is exceedingly healthy; I have never experienced any illness whatever."

The Montaña, or forest region, is a zone but little known, except along the borders of the rivers that are constantly navigated by the rubber hunters. Covered throughout by virgin forests rich in all of the tropical products and traversed by a network of navigable rivers, it is undoubtedly the land of the future. Referring to this region, Humboldt wrote: "The headwaters of the Amazon sooner or later will be the center of the world's colonization."

On the coast wherever water has been obtained, either from the rivers flowing from the Andes or from artesian wells, the land becomes a veritable oasis covered by a rich and varied vegetation. Artificial irrigation alone is needed to produce fields of surprising fertility. The government has under study many problems of irrigation for the purpose of regaining little by little the desert sands. I may say that an expert from the U. S. Geological Survey and an assistant have been engaged by the government to study subterranean watercourses and the artesian-well problem, of vital importance to many provinces.

The plantations get their water generally during the summer months, when the floods rush down the streams. In certain departments, like Ica and Piura,

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vine and cotton plants are planted in ditches about two yards and a half deep. When the rainy season comes the ditches are filled with water, the plants being practically submerged. The thirsty soil absorbs the water and preserves the moisture until the next watering season. In the Department of Piura this peculiarity is still more remarkable, as those lands that can not be irrigated because of the limited water supply depend for their moisture on the periodical and copious rains that occur, curiously enough, about every seven years. During this long period the tracts remain unwatered, and yet continue to yield crops of the best cotton in the world.

Cotton, which comes next to sugar cane among the agricultural products of the coast, is principally grown in the departments of Piura, Ica, and Lima. Piura produces the remarkable cotton called vegetable wool, known in Europe as "full rough" and "moderate rough." This cotton is unique in its class and is used for mixing with wool in the manufacture of woolen goods. So excellent is this cotton that even an expert may mistake it for wool. Its price varies in the market from 20 to 25 cents per pound as compared with that of the ordinary cotton produced in Louisiana, which varies from 5 to 15 cents per pound. It is imported in considerable quantity into this country.

The sugar cane is one of the most profitable of all the agricultural products of Peru, and can be successfully cultivated wherever there is sufficient moisture. Most of the estates are situated on the coast or on the margins of the rivers. It can be cultivated to an altitude of 4,500 feet on the western slopes of the Andes, and as high as 6,000 feet on the eastern slopes.

The production of sugar per acre, as compared with that of other sugar-producing countries, is as follows (a quintal equals 101.5 pounds):

Name of country.	Quintals of cane.	Quintals of sugar.
Peru	700	56
Java	312	31.2
Sandwich Islands	290	29
Egypt	192	19.2
Louisiana	175	10.4

The total production of sugar at present amounts to about 160,000 metric tons a year. What is now wanted is the extension of the area of cultivation and the erection of additional central factories to profitably work these productive lands. The fact that the cultivation of the sugar cane and of most of the products grown along the coast of Peru depends upon artificial irrigation constitutes a valuable advantage by securing sure and permanent crops, and thus keeping men and mills economically at work all the year round.

Simmonds, in his work "Tropical Agriculture," says: "The green and ripe cane are seen in the same field in Peru; they may be cutting at one end and planting at the other, so that the ground is never idle."

The sugar cane grows to the height of 8 to 10 feet in twelve to sixteen months, and can be cut during a period of from five to seven years without replanting.

The home consumption of the sugar is about 20,000 tons per annum, and the total value exported in 1900 was $7,000,000.

I may mention among other products of this zone the following: Rice of the best quality; maize or Indian corn of several varieties, the soil yielding from two to three crops a year; grapes and every kind of fruits of both the temperate and tropical climates. So we have the banana and the apple on the same field; olives, tobacco, every kind of vegetable, alfalfa, cocoa, coffee, etc.

The vegetation diminishes and varies as soon as the coast is left behind and the foothills or lomas of the Cordillera are reached. Owing to the winter showers that give ample moisture, the soil is

covered with herbage and with innumerable yellow flowers that give a greenish-yellow tint to the pasturage that can be detected from the sea. Lying at a height of from 1,500 to 2,000 feet above the sea, the lomas give abundant and healthful food to a great part of the cattle of the coast during the months of June, July, and August.

The scenery in the Sierra or highlands is totally different from what is seen on the coast. The plateaus are surrounded by high mountains of rocky formation, covered with snow and perpetual ice on the summits.

Besides the mineral wealth, of which I shall make special mention, the following products are characteristic of this region: The coca shrub is one of the principal crops cultivated on the Sierra. It is quite a special product of the soil of certain parts of the Sierra. From its leaves cocaine is made, which is exported to Europe. Hamburg is doubtless the best market for cocaine. The market price of coca leaf is 25 cents per pound.

The cultivation of the coca plant is carried on at an altitude of 5,000 to 6,000 feet, and also in some of the warm valleys on the eastern side of the Andes. The seed is sown in January, the young plants being removed in the following year to specially prepared coca fields, where they are planted in rows. They continue to yield crops for forty years. When ready the leaves are picked, then sun-dried, and afterwards packed in bags. The trees soon recover their foliage. Of this plant Prescott says: "The dried leaves mixed with a little lime form a preparation for chewing, much like the betel leaf of the East. With a small supply of this coca in his pouch, and a handful of roasted maize, the Peruvian Indian of our time performs his wearisome journeys day after day, without fatigue, or, at least, without complaint. Even food, the more invigorating, is less grateful to him than his loved narcotic."

Wheat, barley, and oats are grown here, and with better transportation facilities they will supply the whole country.

Peru is the home of the potato. It is grown on the coast, but being subject to frost, the Peruvians rely chiefly on the crops grown in the Sierra. The best crops of potatoes are raised in Huamatanga, about 66 miles from Lima, at an elevation of 7,000 feet. Various products unknown in Europe, such as quinua, alcacer, and others, grow freely here.

Regarding the orchids, Humboldt wrote: "Such is the number and variety that the entire life of an artist would be too short to delineate all the magnificent Orchidea which adorn the recesses of the deep valleys of the Peruvian Andes." A good means of living could always be ensured by hunting out the many varieties, which always find a ready market in European countries.

The Sierra is the center for live stock, and provides meat and wool for the whole country. Upon the Punas, the coldest regions, live the alpaca, the llama, and the vicuña, and sheep and cattle are found in considerable numbers in the whole of this region.

The alpaca lives in a domestic state. It much resembles the llama, but has a smaller neck, and the head is relatively shorter. It is shorn every two years, and furnishes a wool more than 8 inches in length and weighing 6 pounds.

The vicuña differs only from the llama in the color and quality of its wool. The color is a kind of ruddy yellow. The wool is fine as silk and worth four times as much as that of the alpaca. The vicuña still lives in a wild state upon the high Andes. A few rare specimens have been domesticated when captured young.

During the last few years they have succeeded in obtaining a cross between the vicuña and alpaca, called pacovicuña.

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This animal possesses characteristics greatly superior to those of the original. The wool is of better quality and of longer staple. It is as long as that of the alpaca and as smooth and silky as that of the vicuña. The animal is easily domesticated. Today the raising of the paco-vicuña is one of the most important industries to be developed.

The llama is of large size (6½ feet high from the sole to the head) and the body is covered with a rough wool. It has existed in a state of domesticity from the earliest times. The Indians used it as a beast of burden many centuries before the arrival of the Spaniards. It is a precious animal in every sense of the word. It possesses the power of walking whole days with a burden of 100 pounds. This weight appears to be its normal burden, as if exceeded by only a few pounds the animal falls down as if to demonstrate that it is overburdened. As it takes its food while walking along, its pace is necessarily slow. It is so obedient that there is no need to use a stick. They are usually employed from the age of three years, and can be worked up to twelve years of age.

About 60,000 bales of wool are produced annually, nearly all of which come from Cuzco and Puno.

Peru is above all a mining country. The eminent naturalist, Raimondi, in his book, "Minerals of Peru," says: "The abundance and diversity of minerals that exist in Peru are truly prodigious. They are found in every one of its regions."

For hundreds of years the great mineral wealth of Peru has been known to the civilized world. The extent and variety of the deposits are such that it is practically impossible to mention the mineral that does not exist there, and most of them in abundance. The new mining code, containing the most liberal laws, will give still greater impetus to the progress of mining in Peru. The exploitation of the mining industry is entirely open to all comers, without distinction of nationality. The only mining tax is the half-yearly payment of $7.50 per claim. Each claim measures about 10 acres. Up to June 30, 1902, 6,380 claims had been registered in the "Padron General de Minas."

The importation of machinery, implements, and tools for mining purposes is duty free, as is also that of coal, dynamite, timber, quicksilver, and also rolling stock and all materials for use in the construction of railways.

In writing of the Peruvian miners, Mr E. Lane, C. E., English mining engineer, says: "In comparing the labor of the Cholos or Indians with that of the Anglo-Saxon labor, the opinions differ much. The average daily rate of pay for the Cholo laborer is from 50 to 75 cents. The writer has come to the conclusion that as regards the relative cost of the work, there would not be much difference between them and the more highly paid Anglo-Saxon. Most of the skilled labor is done by foreigners or by people of foreign extraction. The Indian of the Sierra is mild and inoffensive, willing to work, and easy to manage."

Gold is found on the coast region of Peru, in veins of ferruginous quartz. In the mountainous districts of the Sierra it is present both as alluvial and in lodes, associated with silver and copper. On the Montaña gold is found in the alluvial deposits along the slopes of the valleys, also in the rivers, and in the numerous veins crossing the formation of silurian rocks, which predominate in this vast zone. On the coast the richest region in gold is Camaná; in the Sierra, in Huanuco, Aymaraes, Cotabamba, etc., and in the Mantaña, in Pataz, Paucartambo, Sandia, and Carabaya.

A number of companies possessing modern machinery have been established to work these gold mines, among which the Inca Mining Company of Bradford, Pa., is prominent.

Both the production and the exportation of gold in Peru are on the increase. Sir Martin Conway, the explorer, announces that placers have been discovered, or, rather, rediscovered, in Peru, the sands of which are so rich in gold that they will in the future seriously compete with the gold fields of the Transvaal, Alaska, and Australia. In the province of Sandia alone 290 important deposits have been discovered, and there are at least as many more in the province of Carabaya. This region of the Andes is the richest in gold of the whole world.

The department of Junin, from its central position, its cereal resources, its iron roads, and its navigable waters, which flow toward the Atlantic, is surely destined to be the scene of great development in the early future. We do not exaggerate when we state that its chief town and its silver mines of incalculable richness will suffice to attract the attention of the entire world, as formerly did Potosi, California, and Australia.

It is calculated that this mineral district produced between 1784 and 1889 about ten milliard francs of silver ($200,000,000). Today (1890) only the tailings abandoned by the old miners are being worked, but these produce an annual amount of 34,000 kilos (68,960 pounds avoir.) of silver.

This mining district, which for nearly three centuries has been exploited for its richness in silver ores, is to be in the near future one of the principal copper-producing centers in the world. The Haggin-Vanderbilt syndicate, organized by several New York millionaires, purchased in 1901 about two-thirds of the mining claims in the district and has built a railroad of about 100 miles that connects the Oroya terminal with the mines. The total investment up to the present is estimated at $10,000,000. A smelting plant is being built for the syndicate, that will have a working capacity of 1,000 tons a day. The engineers in charge roughly estimate a yearly output of 50,000 tons, representing $12,000,000. The plant, to be worked by electricity generated by water power, is expected to be completed before 1906.

At Yauli, which lies to the south of Cerro de Pasco, 225 silver mines are in operation; in the province of Haurochiri, 117; in Huancavelica and Castrovirreyna, 54; in Caylloma, 24, and at Puno over 50.

Mr E. C. Lane, C. E., writes: "Silver is found almost everywhere in the Cordillera and in various combinations with different metals."

The chief districts in which copper is found are Pisco, Ica, Lomas, Chimbote, Cerro de Pasco, Yauli, Cajamarca, Huancayo, Andahuaylas, Cuzco, and Moqeugua.

Iron is found in various parts of Peru. The best known are the Tambo Grande mines (Department of Piura).

Coal is found in many parts of Peru, both in the Sierra and on the coast, being used in considerable quantities in the smelting plants. It is not exported because of lack of transportation facilities.

Petroleum is obtained exclusively, so far, in the Province of Tumbes and in the Department of Piura. There are two companies working these mines, viz., the London and Pacific Petroleum Company and the Establicimiento Industrial de Zorritos.

The total output of these companies is worth $350,000 per annum. Some of the wells at Tumbes have been sunk to a depth of 900 feet. The kerosene is consumed in Peru, and a considerable quantity of crude oil is used as fuel by factories, trades, and other industrial undertakings. Petroleum is also found in the Department of Puna, close to Lake Titicaca. Another valuable substance extremely abundant is sulphur, which is found in many provinces in

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Moquegua, Tarata, and Piura. Mercury, cinnabar, or quicksilver is also found, the most celebrated of all the deposits being at Huancavelica, and is known by the name of Santa Barbara. There are many salt mines in Peru, the total production in 1901 being 15,750 tons. Borax, gypsum, and alabaster are found in large beds in the south, and every day sees an increase in their development.

The transportation system of Peru on land, as well as on water, descends gradually from the commodious and up-to-date railroad and steamship to the trail of the wilderness and the canoes of the rivers.

The first effort of importance at railroad building was undertaken by the government in 1869, when almost all of the existing roads were begun. The loans of 120 million, floated in Europe at that time, were applied to this purpose. Some short lines, however, had been previously built by private enterprise. The total railroad mileage today is about 2,000 miles. With uniform easterly direction, all the railroads serve the same purpose, to give outlet to the products of the valleys they traverse. Two of these, however, are of special importance, because they tunnel the Andean range at a considerable altitude, and are a wonder to the world as veritable masterpieces of engineering. One of these starting from Callao reaches today the mining district of Cerro de Pasco, and another beginning at Mollendo ends by two branches at Puno and Sicuani. The following extract from the *Engineering and Mining Journal* for January, 1904, written by an American engineer, gives a clear idea of the road:

"One of the most interesting trips afforded by the present transportation facilities of the country is that over the Oroya Railroad, which now runs from Callao to the gold fields of Cerro de Pasco. It is considered one of the wonders in the Peruvian world, and the original contract was taken by Mr Meigs at $27,600,000 in bonds at 79. It is certainly the greatest feat of railroad engineering in either hemisphere, and as a specimen of American enterprise and workmanship it suffers nothing by comparison. It was begun in 1870 and finished in 1876, and additional work has since been done on it. Commencing in Callao, it ascends the narrow valley of the Rimac, rising nearly 5,000 feet in the first 46 miles. Thence it goes through the intricate gorges of the Sierras till it tunnels the Andes at an altitude of 15,645 feet, the highest point in the world where a piston rod is moved by steam. The wonder is doubled on remembering that this elevation is reached in 78 miles. One of the most remarkable things in connection with this road is that between the coast and the summit there is not an inch of down grade. The difficulties encountered in its construction were extreme."

Since 1876, when all these roads were completed, nothing of importance has been undertaken, with the exception of the Oroya and Cerro de Pasco Road, built last year by the Haggin-Vanderbilt syndicate.

Many causes are accountable for this: First, the war with Chile and the unsteadiness of governments up to 1894, that ensued as a consequence of the war; second, the lack of capital, government or private. Foreign capital could not be interested under the unsteady conditions prevailing. Now that peace is restored, being today an accomplished fact, the finding of a field for profitable investment is the only problem to solve. The difficulty is not an easy one to overcome; population, progressiveness, traffic, commerce, can not be created nor improvised. The Panama Canal is soon to be opened. Peru needs to prepare for the current of immigration that this waterway will

surely attract to her shores. She needs to build railroads, to open new fields, to develop them, and make them suitable for the new-comers.

These considerations decided public opinion and its representation in Congress to pass the recent railroad law.

By this law the executive is authorized to apply $500,000 this year, $750,000 next year, and $1,000,000 the year after next, and so on, as an encouragement fund for railroad building, to be spent either in the form of a subsidy per mile built or as guaranty of a certain percentage, not to exceed 6 per cent on investments. The roads whose construction is contemplated by the law are, first, one that, starting from a point between Cerro de Pasco and Oroya, shall reach another on the Ucayali River, which is navigable at all times of the year; second, one that, starting from Oroya, shall connect with the towns of Jauja and Huancayo, and, third, one that, starting from Sicuani, shall reach the historic and picturesque city of Cuzco. These sections of road are within the projected route of the Pan-American Railroad.

Besides this already considerable inducement, the following facilities are provided for by the law: Perpetual ownership of the lines; 25 years of exclusive privilege—privilege that excludes the possibility of any other competing line being constructed; free entry to all materials; land grants and further facilities.

Communication between the Orient of Peru, "the land of the future," and the coast was so difficult that it was not uncommon for persons wishing to go from Lima to Iquitos to travel via New York, Para, and up the Amazon. It was in order to avoid this roundabout journey that the government has spent over one million dollars in opening the so-called Via Central, which, starting at the terminal of the Oroya Railroad, reaches by land the navigable waters of the Pichis, then down the rivers until Iquitos is reached in twenty days.

The desire of the government to shorten distances between the Orient and the coast so that the products of the forest region can be exported via the Pacific, a shorter route than that of the Amazon, and finally the wish that the national defense be made efficient, have decided it to complete these railroads as soon as possible and at any cost.

The ideal of a through route by rail from New York to Buenos Aires is not an impossibility, so far as Peru is concerned. The tendency of railroad construction in my country is to complete a central road that shall connect Oroya and Cuzco, and extend from the latter point through Sicuani, utilizing the existing road to Puno, and from Puno to the Bolivian frontier. Bolivia has constructed a small road that is within the projected Pan-American route, while on the other side Argentina is today reaching with her rails the Bolivian frontier. So the day is not far distant when Lima wil communicate by rail with Buenos Aires.

The Amazon is formed by the confluence within Peruvian territory of the Ucayali and Marañon Rivers, and follows from its formation an easterly course with a slight northerly inclination. It receives numerous affluents both from its northerly and southerly banks, among which the following are worth mentioning: From the south the rivers Yavari, Yuruá, Purus, Madeira, etc.; from the north the Napo, Putumayo, Yapura, Rio Negro, etc.

The greater part of these rivers were explored by rubber hunters in the early part of the last century, and the interesting and exciting reports of their adventures, the beauty of the scenery, their encounters with uncivilized tribes, together with the richness of their river banks, attracted the attention of the government at Lima as early as the

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fifties. Many expeditions have since that time been organized under government auspices, many of them failing because of the immense obstacles in the way—dangerous trails, wrecks in the unknown rivers, inclemencies of the weather, etc.—but many of them have produced excellent results.

Little by little the rubber trade has developed. Steam navigation by large liners has been established up the Amazon as far as Peru, and with minor craft through its many tributaries; the town of Iquitos has come into existence with its ten thousand inhabitants, and its future, as well as that of the whole region, is assured.

The imperfect results of former expeditions and the necessity of conducting them under a thoroughly scientific basis resulted in the organization of a "Board of River Navigation" in April, 1901. This board, while residing at the capital, has under its charge the organization of expeditions to our oriental region, and since it was founded three very successful expeditions have been carried out—one to the River Tambopata, a tributary of the Madre de Dios; another to the Inambery, also a tributary of the Madre de Dios, and a third expedition to confirm the famous discoveries of the isthmuses that separate the basins of the Yucayali with those of the Madre de Dios, Purus, and Yurua.

Each one of the expeditions was in charge of a military officer. The staff included a naval officer, who had charge of the study of the navigation of each river and had to report as to soundings, velocity of the streams, rise of waters during the rainy seasons, determination of geographic coördinates, etc.; a civil engineer, who was to study the work of improving navigation, the roads, bridges, etc.; a physician, who had as his duty to report on the biology of the regions traversed, climatology, diseases among the Indian dwellers, etc.; a naturalist, who was to make a collection and study of the zoölogy, mineralogy, and botany of the rivers explored; and, finally, a photographer, who was to take all the pictures and snapshots of interest that would serve to illustrate the reports of the expeditions. A map of each river, of each road, and plans of projected improvements were to be made. The reports of these three expeditions are most flattering as to results and have encouraged the Board of Navigation in the organization of others that will soon start on their way.

By far the most interesting one of the three expeditions is that to the isthmuses that separate the basins of the Ucayali, Madre de Dios Purus, and Yurua. The Madre de Dios is a tributary of the Madeira, and the other two of the Amazon directly. A glance at the map will show that the headwaters of these three rivers are within Peruvian territory, but until a few years ago they could only be reached through Brazil. A rubber hunter by the name of Fitz-Gerald, trying to avoid the long and tedious navigation down the Madre de Dios and then through the Madeira until the Amazon was reached, and desiring to transport his rubber via the Ucayali River, discovered an isthmus of about six miles that separated both basins. The report of this discovery, as well as that of other isthmuses separating the rivers Purus and Yurua from the Ucayali, and which made it possible for the Peruvian government to reach these rivers without having to cross Brazilian territory, caused the sending of the expedition mentioned, which has in every way confirmed the importance of the discovery.

Prominent among the products of this immensely rich region stands the rubber tree, of which there are many varieties. Coffee is also produced in considerable quantity and suffers nothing in comparison with the coffee of

other regions. Next in order follow the aromatic vanilla, the cocoa tree, all sorts and varieties of medicinal plants, palms with their many products, hardwood, and woods of every variety and description, the quina tree, from which quinine is manufactured, etc., etc. The zoölogy of the Montaña or forest region is as varied as its botany. I may mention as peculiar to this zone the savage pig or *jabalí*, the puma or Peruvian lion, the South American bear, the crocodile, the boa, and the monkey. Its mineralogy has been treated already in speaking of our mines and mining.

The policy of the government and legislation with regard to these lands is most liberal. Rubber lands or forest land in general may be purchased or leased at really nominal prices, namely, purchased at $2.50 for two and a half acres or leased at 50 cents yearly per two and a half acres. Free grants are made for lots not to exceed five acres. Our legislation in general, especially with regard to civil rights, does not make any distinction between the Peruvian citizen and the alien.

The future development of the country depends, however, on the opening of the Pacific route and the continuity of both rail and water transportation. Four hundred miles of railroad are to connect a port on the Pacific, say Payta, with Puerto Menendez on the Marañon. From the latter point and within a radius of 1,000 miles there are about 5,000 of navigable rivers, mostly within Peruvian territory. Payta is about 2,300 miles from New Orleans. Thus the heart of South America will be, when the canal is completed, about 3,300 miles from the nearest port in this country.

As commerce results, the products of our tropical zone will have to find a market in the temperate zone. Where will this market be? It will surely be at the nearest center of consumption; and as the United States will take this position when the canal is completed, our export trade is bound to be with this country. On the other hand, we are and shall be consumers of manufactures and other products, and while we today are principally supplied with the European article, will this be the case tomorrow, when the manufacturing centers of this country will be 3,000 miles nearer to us than any others?

Thus, in my opinion, there is no question as to the commercial relations between the United States and South America, nor as to the sure preponderance of this country over all others in the trade with the republics to the south. If this means something today, it will mean more in 20, 40, or 60 years from now, when our new countries will be flooded with immigrants and consequently with more consumers of American goods.

The Panama Canal will give us life. Peru is no longer to be in a remote corner of the globe. While today all the traffic with this country, for instance, is made via the Straits of Magellan, with a distance of 9,000 miles, tomorrow it will be done through Panama, with a distance of 3,000 miles only. While today it is impossible for us to attract immigration to our shores because of high rates produced by monopoly at the Isthmus, and monopolies in the traffic at both sides, it will no longer be so tomorrow, when the canal destroys the monopolies, when it will be free to all, and all compete for the traffic, with the result that low rates are established. Where, as heretofore, transit at the Isthmus has been not only inconvenient, but dangerous, because of unhealthy conditions and bullets of revolutionary outbreaks, the work of the United States government in the near future will insure health and order on the Isthmus and make the transit through Panama no longer an inconvenience, but a veritable pleasure trip.

To close my remarks, I wish to show you graphically our progress since peace

was established, and then read a few lines on our capital, the city of Lima.

Among the towns properly so called, Lima or Laima occupies the premier position. It is the capital, and is the manufacturing and commercial center of Peru.

It is connected with the port of Callao by two lines of railway and electric cars. The Northern Railway extends as far as the port of Ancon, while the southern line forms a connection with the watering places of Miraflores, Barranco, and Chorillos, about 9½ miles, with which another electric road has been established. Lima, containing a population of 130,000 inhabitants, with its spring climate and its proverbial hospitality, is one of those American towns where the foreigner can enjoy all the charms of the most polished society. The stranger is welcomed everywhere, and, provided that he only makes himself agreeable, every door is opened to him with much greater readiness than in the old world.

It is a modern city in every way, although preserving its picturesque colonial aspect. It has every improvement—electric light, gas, telephone, modern sewerage, splendid water supply, asphalt paving, etc.

The state of culture in Lima is more advanced than one would think. Its university is the most ancient in America, and is organized in the same manner as those in Europe, and in all respects has nothing to fear from comparison with the universities of the new world. The beauty of the city is being continually enhanced by the addition of new parks, avenues, monuments, squares, and public buildings.

Callao is the chief port of Peru, and its bay is safe, large, and sheltered. The docks, which cost £2,000,000, allow the largest ships to come right alongside the quays. There is a floating dry dock, its inner measurements being 300 feet long by 76 feet wide, with a depth of 29 feet 3 inches.

AGRICULTURE IN JAPAN

By U. S. Consul-General Bellows, Yokohama, Japan

ONLY 14,995,272 acres, or 15.7 per cent of the whole area of Japan, exclusive of Formosa, consists of arable land, and 55 per cent of the agricultural families cultivate less than 2 acres each; 30 per cent cultivate 2 acres and less than 3¾ acres, leaving 15 per cent of the farmers who cultivate farms of 3¾ acres or more. A comparison of the whole area under cultivation with the number of farm workers shows that, on an average, one man cares for a little less than an acre.

An American farmer will naturally wonder how the Japanese farmer can support his family from the produce of so small a farm, and how he employs his time on it. The Japanese standard of living is far below the American, and the income of the Japanese farmer is usually increased by his engaging in some subsidiary industry, such as rearing silkworms, reeling silk, or spinning, and by working for wages in the intervals of farm work. In his work on the farm he seldom uses a horse or other draft animal, and his tools are of a very primitive character. He fertilizes and cultivates very thoroughly, and is thus enabled to secure a more abundant harvest, besides often raising two or more crops a year on the same field. In the warmer latitudes of Japan barley, indigo, beans, and rape are grown successively on one

plat of ground within the space of a year.

There are no reliable data respecting the proportion of independent and tenant farmers, the latest published estimates being based on returns made fifteen years ago. According to these estimates, a little more than half the cultivated land was leased to tenant farmers, the remainder being worked by the owners. The lot of the tenant farmer is far from easy, the high price of land forcing him to lease on terms which leave him a very small return for his labor after he has paid for the necessary fertilizers. These conditions tend to retard the advancement of agriculture by preventing the purchase of new tools and hindering any effort the farmer may make to adopt improved methods.

The government has attempted to aid the progress of agriculture by laws respecting irrigation, the protection of forests so as to control the flow of rivers in the interest of the farmer, the formation of farmers' guilds, the rearrangement of farm boundaries, and the improvement of drainage systems. Small as the farms are, their parts are usually separated so that a farm of 2 acres may consist of several nonadjacent lots, the average size of a lot being about one-eighth of an acre. A law which went into force in 1900 provides for the rearrangement of boundaries by farmers exchanging fields for those owned by others so as to make the farms more compact and enlarge the fields to permit the use of horses and machinery, at the same time increasing the tillable area by straightening some boundaries and removing others. About 20,000 acres have already come under the operation of this law.

For the purpose of further promoting agricultural interests the government maintains a state experimental farm and nine branch farms. The work at these farms is largely theoretical, and is divided into eight departments, viz., seed, saplings, agricultural chemistry, entomology, vegetable physiology, tobacco, horticulture, and general affairs. The results of the investigations are submitted to thirty-eight experimental farms, created and carried on by the provinces with the help of a subsidy from the general government, and theories are here subjected to the test of practical application before general publication. Among the results already accomplished by this method are improvement in the quality and quantity of crops through more careful selection of seeds and better understanding of the varieties suited to the conditions in different localities; more efficient modes of destroying injurious insects; ability to minimize the injury from plant diseases, such as smut, mildew, pear cluster-cups, etc.; increased skill in the application of fertilizers, and the discovery of indigenous grasses suitable for meadows, all meadow grasses having formerly been imported.

The general government aids the local treasuries to maintain six local agricultural schools for the instruction of farmers' sons in the general principles of agriculture, surveying, veterinary science, and related subjects. The government also carries on an experimental tea farm, on which is a curing workshop; a laboratory for investigating the diseases of cattle and poultry; a cattle-breeding pasture for improving the native breeds of cattle for meat and dairy purposes, and two horse-breeding pastures for promoting the introduction of better horses.

Efforts have been made to introduce sheep raising and swine raising, but with only partial success. It is claimed that the conditions of climate and food supply present no serious obstacles to the success of sheep farming, but the statistics of 1901 showed only 2,545 sheep in the country. Swine raising has succeeded better, but can not yet be spoken of as an established industry of much importance, the number of

swine having remained in the vicinity of 200,000 for several years.

Besides the encouragement and assistance to agriculture furnished through the agricultural schools and experimental farms and laboratories, the government aids and promotes the development of agricultural interests by means of the hypothec banks. Recognizing that many operations necessary to the prosperity of agriculture require a heavy investment which will not yield immediate returns, and that farmers are therefore not able to pay the high interest or accept the conditions of short-time commercial loans, the government has established the hypothec banks for the special accommodation of this class of borrowers. These banks are under the direct supervision of the finance minister, subject to strict regulations, and in return receive a certain degree of support from the government. They are permitted to make loans only for the following purposes: (1) Reclamation of land, irrigation, drainage, and improvement of the fertility of the soil; (2) construction and improvement of farm roads; (3) settlement in newly reclaimed places; (4) purchase of seed, young plants, manure, and other materials required in agriculture and industry; (5) purchase of implements and machines, boats, wagons, or beasts for use in farming and manufacture; (6) construction or repair of buildings for use in farming and manufacture; (7) improvements in farming and manufacture not included in the foregoing clauses; (8) rearrangement of farm boundaries; (9) undertakings by credit guilds, purchase guilds, and produce guilds of unlimited liability and organized under the industrial-guilds law.

The credit guilds are organizations of the farmers for the promotion of their common interests, and in some respects resemble the coöperative home-building associations of the United States. When organized in conformity with prescribed conditions, they are permitted to borrow money from the hypothec banks on very favorable terms, and the members may often obtain loans which the circumstances would prevent them from securing except through the guild. These guilds also undertake works for the common benefit, especially such as concern control of the course and volume of rivers, irrigation and drainage systems, road building, reclamation of uncultivated land, measures for protection against insect pests, and similar enterprises.

Stable manure and night soil have been used as fertilizers by the farmers of Japan from time immemorial, but in recent years the supply of these has been found wholly inadequate to the needs of the land, and artificial manures have come into general use. As the farmers were liable to be imposed upon by the venders of these, the government in 1901 enacted a law for controlling fertilizers. This law requires those who manufacture or deal in fertilizers to procure a license, to submit samples of their goods to the proper officers for inspection, and to guarantee the alleged composition. The government has distributed 116 fertilizer inspectors among different districts and has appointed 20 chemists at the state experimental farms to take charge of the analysis of fertilizers. In 1902, 3,697 applications for analysis of fertilizers were made to the farms and 7,685 analytical tables were prepared. Lecturers sent out from the agricultural schools and laboratories have explained to the farmers the primary essentials of fertilizers and the different requirements of different crops, so that the farmers have become generally intelligent on these matters. In 1901 the artificial fertilizer manufacturing companies of Japan produced 62,400 tons; 151,000 tons of fish fertilizers were produced, and 83,967 tons of Chinese bean cakes were imported for use as fertilizers. Artificial fertilizers are

also imported from Great Britain, fish guano from Siberia, animal bone from China, and other fertilizing materials from different countries.

The principal agricultural products, named in the order of their acreage, are rice, rye, barley, wheat, beans, mulberries, sweet potatoes, millet, buckwheat, rape, red beans, Italian millet, tea, indigo leaves, potatoes, sorghum, tobacco leaves, cotton, and hemp. The area devoted to rice cultivation constitutes a little more than two-fifths of the total area of arable land. The greater part of the rice fields are in low-lying land, which can be easily flooded, but some upland rice is raised. Mulberry trees and tea plants are usually planted on land not suitable for more important crops, such as the slopes of hills, sandy dunes, and similar places. In the warmer parts of the empire barley and rape are often raised as a second crop after rice has been harvested, but farther north the excess of moisture required for rice leaves the land too cold for another crop the same year.

Stock raising is still in its infancy in Japan, and is not likely to become an important industry, owing to the high price of land and the coarseness of the native grasses, most of which are not fit for food for cattle or horses. Oats and maize as foods for farm animals are practically unknown, and what passes for hay is a kind of straw, which is chopped fine before it is fed to horses. A little less than one-sixth of the arable land consists of plains and pastures, and of this about two-fifths belong to the state and the imperial household, the remainder being owned by private stock raisers, who raise stock principally for tillage and draft animals. The natives are not accustomed to the use of butter or milk, and do not usually like the taste of them, and their religious prejudices have hitherto prevented the general use of meat of any kind, although they now seem to be developing a taste for all these kinds of food.

Farmers do not engage in poultry raising to a sufficient extent to provide the eggs needed for home consumption, these being imported from China to the value of over $500,000 per year. Fruit raising, under the stimulus of government encouragement, has advanced considerably, but is not yet an important branch of farming in this country. Bee culture is also engaged in to a limited extent.

LAKE CLARK, A LITTLE KNOWN ALASKAN LAKE

BY WILFRED H. OSGOOD, OF THE U. S. BIOLOGICAL SURVEY

LAKE CLARK is situated northwest of Cook Inlet, near the base of the Alaskan Peninsula, and, although comparatively accessible, it was not discovered by white men until 1891. In February of that year J. W. Clark, agent of the Alaska Commercial Company at Nushagak, and A. B. Schanz, of the Eleventh Census and of Frank Leslie's Alaska Expedition, ascended the Nushagak Valley with dogs and sleds, crossed the divide at the head of a small southeastern tributary of the Nushagak River, and descended to the lake which now bears Clark's name. This winter trip of Clark and Schanz gave but little opportunity for exploration, and since their rather limited ac-

count nothing further has been published about the region. It was, therefore, with considerable interest that I started in July, 1902, on a trip, the itinerary of which was to include Lake Clark.

There are two practical routes to the lake, one by way of Iliamna Pass, where it is necessary to cross the mountains between Iliamna Bay and Lake Iliamna, and another, almost entirely by water, by way of Bristol Bay, and thence up the Kvichak River to Lake Iliamna, which receives the waters of Lake Clark through the Nogheling River. It is also possible to go in summer or winter by the route of Clark and Schanz by the lower Nogheling and impassable for boats. The portage is about 6 miles in length, the first half being over rather swampy open country and the last through open forest on comparatively hard ground. The Nogheling is a large, swift stream from 25 to 30 miles in length; above the portage there is one stretch of a third of a mile of swift water easily descended by canoes, but difficult of ascent except at low water, when tracking is practicable; otherwise the stream is easily ascended.

Our first view of Lake Clark from some low hills near the head of the Nogheling River was not particularly impressive, as we were so situated that

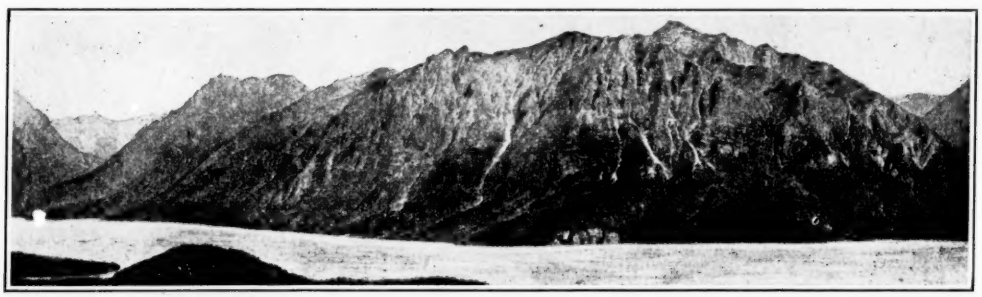


Photo by Osgood

Mountains on Southeast Side of Lake Clark

way of the Nushagak and Chulitna rivers; but this is rather an arduous trip at either season. The natives use all three routes, although the last named has been rarely traveled in recent years. Our party entered at Iliamna Bay, and being fortunate enough to secure pack horses at the head of the bay crossed the 12-mile portage in one day to a small native village on Iliamna River, about 6 miles above its entrance into Lake Iliamna. Another day took us by canoe across some 30 miles of the upper end of Lake Iliamna to the Nogheling Portage, about 10 miles east of the mouth of the Nogheling River. A portage is necessary here to avoid the Petroff Falls, so called by Schanz, which are in

we could see only the lower end of the lake, where the shores are comparatively low; but when once on the lake itself, with an unobstructed vista of the greater part of its length before us, the view was magnificent. The mountains, which are from 500 to 1,000 feet in height at the lower end of the lake, extend down either side of the narrow stretch of water, gradually becoming higher and higher and more and more rugged until in the extreme distance some of the highest with snow-capped summits seem to merge with the hazy clouds. Near the head of the main lake several detached peaks rise up seemingly from the middle of the lake, but a nearer view shows them to be some distance

inland. In reality the mountains are not very high, but their gradual increase in height from one end of the lake to the other and the misleading vista effect causes them to appear quite lofty. The higher peaks immediately surrounding the upper end of the lake are possibly 6,000 feet in altitude; others, which may be seen at a distance, are somewhat higher. All of the mountains on the south side and most of the others are of volcanic origin, evidently dating from no very remote geological period. Those about the upper end are very steep and only slightly eroded; there are no very deep canyons or wide valleys, no well rounded summits, but usually jagged rocky pinnacles instead. The slopes above timber line are so steep that there is no room for large snow banks, and although perpetual snow often occurs at such altitudes in this latitude, there is extremely little on these mountains. Several high-hanging glaciers may be seen, however, at the head of narrow canyons on the south side near the head of the lake. Granite is found on the north side and predominates for about 5 miles at the extreme end of the lake, perhaps being the termination of similar formations to the northward in the main part of the Alaskan Range. Mt Redoubt, which has been represented as rising from the shore of Lake Clark, is not visible from any part of the lake or from any of the peaks that we ascended. However, volcanic ashes, supposed to have been thrown from Mt Redoubt, were found in abundance all about the head of the lake.

Several of the streams that enter the upper part of the lake carry considerable glacial waste in suspension, which gives a grayish brown color to the waters of the entire lake. One of these streams, called the Tleekakeela by the natives, which comes in on the north side about 10 miles from the head, has deposited very large quantities of sand and silt, forming a wide delta, which effectually blocks that side of the lake and virtually cuts off the water above it as an individual lake. On the south side there is a strong current between this upper section and the main lake, and the channel is not more than 200 yards wide. The upper part, however, has no resemblance to the long, T-shaped arm which has been shown on recent maps. This stream, the Tleekakeela, is navigable for canoes or native bidarkas for a considerable distance, and the natives report a portage from some point near its headwaters to Cook Inlet, in the vicinity of Tyonek. This portage crosses at least one glacier and is probably rather a difficult one. Another portage which is much used by the natives extends in a northwesterly direction from the village of Keeghik through several low passes in the mountains to Trail Creek, a tributary of the Kuskokwim River. The trip is made in 2 or 3 days without heavy impedimenta, or, as the natives say, it is a case of "tree day, spose no paack; fi day, spose paack." Several white men have crossed this portage and report it not difficult. An expedition to the upper waters of the Kuskokwim River might find this a desirable route.

At the lower end of the lake and also on the north side of the Nogheling River are several old terraced beach levels, apparent evidence of a former occupation by salt water. The valleys of the Chulitna and Nushagak rivers also seem to have been part of a sea basin. The whole region is but little above sea level, and a very slight depression of the land would allow the waters of Bristol Bay to occupy the basins of Lakes Iliamna and Clark and the greater part of the valleys of the Chulitna and Nushagak rivers.

The stream entering the extreme head of the lake is also of good size, about 80 feet wide at the mouth and navigable for small boats some 20 miles.

XUM

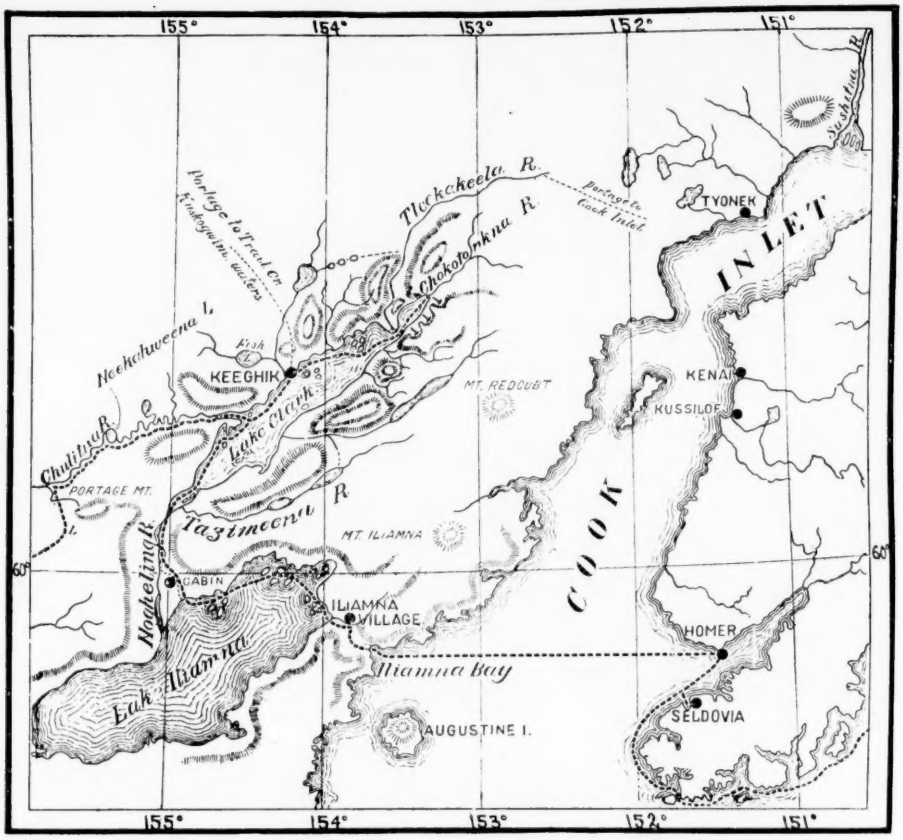
It is called Chokotonkna River by the natives, but several prospectors who visited it had designated it as Clark River. Portage or Achteedeedung Creek, which enters the north side of the lake about half way between Keeghik and the mouth of the Tleekakeela, is the only stream on which gold has been found. About half a dozen men have worked on this creek and secured a few fair samples of placer gold, but nothing that pays for working.

The natives of Lake Clark are collected in one village situated on the north side at the mouth of Keeghik Creek. They universally call this settlement Keeghik, although the name Nikhak, which has been used, is known to most of them. Keeghik is also the original native name for Lake Clark. The village consists of about a dozen houses and caches of hewn logs, very substantially and well made. About half a mile back from the present village are very ancient traces of a large village of former times. In 1891 Schanz enumerated 42 inhabitants of Keeghik, which is perhaps twice the number now there. Some were away at the time of our visit, so we saw only about a dozen.

Photo by Osgood

Natives of Keeghik Village, Lake Clark

Nearly all are of mixed blood, usually with considerable trace of Russian, but their main derivation has been from pure Indian tribes on the upper Kuskokwim drainage and the Kenai tribes from the head of Cook Inlet. Doubtless they may safely be considered the westernmost representatives of the pure Athabascan stock. Their language is now as much or more mixed than their blood, although the speech they profess as their



Sketch Map of Lake Clark and Vicinity

own is a dialect similar to that of the Kenai tribes. Very few of them speak much English, but nearly all are proficient in Russian and in modified Aleut, as well as in several Indian lingoes. They go to the coast frequently, but have suffered less from the deteriorating influences of the whites than most of their neighbors. They hunt and fish much as their forefathers did, though, of course, many of them have modern arms, and they do not confine their field to allotted or hereditary districts so much as formerly. Their main food supply is the salmon, which run up the Nogheling River in large numbers and enter most of the streams at the lower end of Lake Clark. Large game is not abundant on the immediate shores of the lake, and apparently never has been, but there are fairly good hunting districts within a few days' journey. An occasional moose or caribou is found about the lake, but neither is common, and the natives do no systematic hunting for them there. White sheep are found on the mountains between the lake and Cook Inlet, but they remain far back from the lake throughout the summer. Small game is much more plentiful. The Alaska spruce grouse is excessively abundant, and the Dall vary-

ing hare is also found in large numbers. Fur-bearing animals are not particularly abundant.

A good growth of timber surrounds the entire lake, the forest as a whole being of much the same type as that which occupies the greater part of the interior of northern Alaska. The white spruce (*Picea canadensis*) is the prevailing tree, and as a rule it is of very fair size. The average tree is about a foot in diameter, but some are larger; several measured breast high were found to be over 6 feet in circumference. In moist situations and on comparatively level ground the black spruce (*Picea mariana*) was found in abundance. The deciduous trees, mainly of three species, are scattered through the coniferous forest or gathered in thick clumps. The paper birch (*Betula papyrifera*) is perhaps most abundant, but it is not large, being exceeded by the poplar (*Populus trichocarpus*). The aspen (*Populus tremuloides*) is also found in many localities, and the usual alders and willows occupy their respective areas, while smaller boreal plants, moss, lichens, etc., are found in characteristic profusion.

The entire length of Lake Clark we estimated to be between 50 and 60 miles. Its width varies from two to eight or ten miles, the widest part being about opposite the mouth of the Chulitna River. We made no soundings, but the depth of water must be considerable, particularly on the south side, where the mountains rise abruptly from the water's edge. According to Schanz, bottom can not be reached in many places within 100 fathoms. On the north side, however, it is comparatively shallow. Numerous gravelly beaches occur there, and small islands are scattered along near the shore.

The general contour of the lake, particularly the upper part of it, we found quite different from that usually shown on maps of Alaska, and I have been unable to ascertain the origin of the large T-shaped arm, which does not exist, but which appears on all maps where the lake is indicated at all. Our time was so occupied by other work that we were unable to attempt anything in the nature of an accurate map of the lake, but a few hasty sketches were preserved. Our photographs were also none too good, as the films were not developed until several months after the exposures were made, and meanwhile were carried in a canoe on a long trip during continuous wet and very stormy weather.

THE GEOGRAPHICAL PIVOT OF HISTORY

THE PHYSICAL FEATURES OF THE WORLD THAT HAVE BEEN IN THE PAST AND WILL BE IN THE FUTURE THE MOST COERCIVE OF HUMAN ACTION

AT a recent meeting of the Royal Geographical Society in London Mr H. J. Mackinder delivered an address on "The Geographical Pivot of History," in which he asserted that the pivot around which the destiny of nations has revolved in the past has been the great steppes of interior Asia—of Siberia and Mongolia—and that the history of future centuries will revolve even more dependently around these enormous plains, whether dominated by the Russian, Chinaman, or Japanese. In other words, the social movements of all times, past and future, have played and are to play around the same physical features, the heart of Asia. There is much food for thought for this ap-

parently startling statement, though probably not many Europeans and few Americans can accept Mr Mackinder's arguments and conclusions, as far as the future is concerned.

Mr Mackinder begins by calling the last four hundred years the Columbian era, inasmuch as the great motive of this period has been the discovery, occupation, and development of the new world—the expansion of Europe. The exploration of the world is now completed; there are no new outlets to be opened by discovery and a new era must begin. The nations today are in the same condition they were in four hundred years ago, before the voyage of Columbus. They are all fenced in once more, and now, as then, every explosion of social forces, instead of being dissipated in a surrounding circuit of unknown space and barbaric chaos, as during the Columbian era, will be sharply and destructively reëchoed from the far side of the globe.

At the beginning of this new era all nations once more face the vast interior expanse of Asia; from it during the new era will come again the most coercive forces for the action of nations.

Mr Mackinder recalled how all the great invasions of Europe in the pre-Columbian era came from central Asia, entering through the gap between the Ural Mountains and the Caspian Sea. For successive centuries Europe was nearly swept away by these resistless hordes—Huns, Avars, Bulgarians, Magyars, Mongols, and Kalmuks. The full meaning of Asiatic influence on Europe is not, however, describable until we come to the Mongol invasions of the fifteenth century; these hordes gathered their first force 3,000 miles away, on the high steppes of Mongolia. All the settled margins of the Old World sooner or later felt the expansive force of mobile power originating in the steppe. Russia, Persia, India, and China were either made tributary or received Mongol dynasties. Even the incipient power of the Turks in Asia Minor was struck down for half a century.

The strength of Asiatic hordes lay in their mobility, and ceased when they entered the forests and mountains.

The grim determination of European peoples to check these successive hordes and not be crushed into a widespread despotism was the principal reason of European advance and unity during all these ages. Thus the spirit which stimulated the peoples of Europe and made them progress was the healthy and powerful reaction against pressure from the steppe lands of Asia.

The discovery of the New World changed the relations of Europe and Asia. Europe no longer watched in dread for what might come from Asia. She turned her back on Asia and founded new Europes beyond the oceans.

But now the whole world is occupied and well filled with people, save only the vast steppes of Euro-Asia. Europe is fenced in again as she was 400 years ago, and can expand no farther. The land power, the steppes of the Russian Empire and Mongolia, dormant while the oceans were being overrun, will now reassert itself. Railways are to give the steppes mobility and replace the horse and camel. Here there is room for hundreds of millions, who shall derive countless riches from the wealth of fertile plains, boundless forests, and neighboring mountains.

For the first time within recorded history we have a great stationary population being developed in the steppe lands. This is a revolution in the world that we have to face and reckon with.

"As regards the potentialities of the land and of the people, I would point out that in Europe there are now more than 40,000,000 people in the steppe land of Russia, and it is by no means yet densely occupied, and that the Russian population is probably increasing faster than any other great civilized or

half-civilized population in the world. With a decreasing French population and a British not increasing as fast as it was, and the native-born population of the United States and Australia coming nearly to a standstill, you have to face the fact that in a hundred years 40,000,000 people have occupied but a mere corner of the steppe. I think you are on the way to a population which will be numbered by the hundred million. . . .

"The steppe lands are the heart of Euro-Asia; that continuous land, ice-girt in the north, water-girt elsewhere, measuring 21 million square miles, or more than three times the area of North America, whose center and north, measuring some 9 million square miles, or more than twice the area of Europe, have no available waterways to the ocean, but, on the other hand, except in the subarctic forest, are very generally favorable to the mobility of horsemen and camelmen.

"To east, south, and west of this heart land are marginal regions, ranged in a vast cresent, accessible to shipmen. According to physical conformation, these regions are four in number, and it is not a little remarkable that in a general way they respectively coincide with the spheres of the four great religions—Buddhism, Brahminism, Mahometanism, and Christianity. The first two are the monsoon lands, turned the one toward the Pacific, and the other toward the Indian Ocean. The fourth is Europe, watered by the Atlantic rains from the west. These three together measuring less than 7 million square miles have more than 1000 million people, or two-thirds of the world population. The third, coinciding with the land of the Five Seas, or, as it is more often described, the Nearer East, is in large measure deprived of moisture by the proximity of Africa, and, except in the oases, is therefore thinly peopled. In some degree it partakes of the characteristics both of the marginal belt and of the central area of Euro-Asia.

"Is not the pivot region of the world's politics that vast area of Euro-Asia which is inaccessible to ships, but in antiquity lay open to the horse-riding nomad, and is today about to be covered with a network of railways?

"Russia replaces the Mongol Empire. Her pressure on Finland, on Scandinavia, on Poland, on Turkey, on Persia, on India, and on China, replaces the centrifugal raids of the steppemen. In the world at large she occupies the central strategical position held by Germany in Europe. She can strike on all sides and be struck from all sides, save the north. The full development of her modern railway mobility is merely a matter of time. Nor is it likely that any possible social revolution will alter her essential relations to the great geographical limits of her existence. Wisely recognizing the fundamental limits of her power, her rulers have parted with Alaska; for it is as much a law of policy for Russia to own nothing over seas as for Britain to be supreme on the ocean.

"Outside the pivot area, in a great inner crescent, are Germany, Austria, Turkey, India, and China, and in an outer crescent Britain, South Africa, Australia, the United States, Canada, and Japan. Britain, Canada, the United States, South Africa, Australia, and Japan are now a ring of outer and insular bases for sea-power and commerce, inaccessible to the land-power of Euro-Asia. In the present condition of the balance of power, the pivot state, Russia, is not equivalent to the peripheral states, and there is room for an equipoise in France. The United States has recently become an eastern power, affecting the European balance not directly, but through Russia, and she will construct the Panama canal to make her Mississippi and Atlantic resources avail-

able in the Pacific. From this point of view the real divide between east and west is to be found in the Atlantic Ocean.

"The oversetting of the balance of power in favor of the pivot state, resulting in its expansion over the marginal lands of Euro-Asia, would permit of the use of vast continental resources for fleet-building, and the empire of the world would then be in sight. This might happen if Germany were to ally herself with Russia. The threat of such an event should, therefore, throw France into alliance with the over-sea powers, and France, Italy, Egypt, India, and Korea would become so many bridge heads where the outside navies would support armies to compel the pivot allies to deploy land forces and prevent them from concentrating their whole strength on fleets. On a smaller scale that was what Wellington accomplished from his sea-base at Torres Vedras in the Peninsular War. May not this in the end prove to be the strategical function of India in the British Imperial system? Is not this the idea underlying Mr Amery's conception that the British military front stretches from the Cape through India to Japan?

"The development of the vast potentialities of South America might have a decisive influence upon the system. They might strengthen the United States, or, on the other hand, if Germany were to challenge the Monroe doctrine successfully, they might detach Berlin from what I may perhaps describe as a pivot policy. The particular combinations of power brought into balance are not material; my contention is that from a geographical point of view they are likely to rotate round the pivot state, which is always likely to be great, but with limited mobility as compared with the surrounding marginal and insular powers.

"I have spoken as a geographer. The actual balance of political power at any given time is, of course, the product, on the one hand, of geographical conditions, both economic and strategic, and on the other hand, of the relative number, virility, equipment, and organization of the competing peoples. In proportion as these quantities are accurately estimated are we likely to adjust differences without the crude resort to arms. And the geographical quantities in the circulation are more measurable and more nearly constant than the human. Hence we should expect to find our formula apply equally to past history and to present politics. The social movements of all times have played around essentially the same physical features, for I doubt whether the progressive desiccation of Asia and Africa, even if proved, has in historical times vitally altered the human environment. The westward march of empire appears to me to have been a short rotation of marginal power round the southwestern and western edge of the pivoted area. The Nearer, Middle, and Far Eastern questions relate to the unstable equilibrium of inner and outer powers in those parts of the marginal crescent where local power is at present more or less negligible.

"In conclusion, it may be well expressly to point out that the substitution of some new control of the inland area for that of Russia would not tend to reduce the geographical significance of the pivot position. Were the Chinese, for instance, organized by the Japanese to overthrow the Russian Empire and conquer its territory, they might constitute the yellow peril to the world's freedom just because they would add an oceanic frontage to the resources of the great continent, an advantage as yet denied to the Russian tenant of the pivot region."

At the conclusion of Mr Mackinder's address, a number of objections were raised against his arguments by members of the audience. Sir Thomas

XUM

Holdich, the arbitrator of the Chile-Argentine boundary dispute, and one of the foremost authorities on South American matters in the world, made two points, as follows:

(1) One of the great reasons, one of the compelling reasons, for all the migrations from Asia has been a distinct alteration in the physical condition of the country.

(2) South America will be a potent factor in the outer belt of power to bring coercion to bear on the inner power pivoting about the south of Russia.

"The potentiality of South America as a naval power I look upon as very great. I believe that in the course, say, of the next half-century, in spite of the fact that just now Argentina has sold two ships to Japan, and Chile has sold a couple of ships to us, in spite of that fact, there will be an increase of naval strength in South America, resulting from purely natural causes, for the defense of her own coast and the protection of her own traffic, which will be only comparable to the extraordinary development which we have seen during the last half-century in Japan."

Mr Amery made three points:

(1) As regards the supposed "hordes" of invaders which came from the interior, I do not myself believe there ever were those very large hordes and large populations in the interior. The fact is this: the steppe populations were small then, as now, but from the fact of their mobility the heavier and slower military armies could not successfully attack them. You remember the difficulty the Roman legions had with the Parthians, and I think we can find a very much more recent example of the difficulty a civilized state finds in conquering a steppe power. Only a short time ago the whole of the British army was occupied in trying to coerce some 40,000 or 50,000 farmers who lived on a dry steppe land.

(2) In the old days the ships were mobile enough, but they carried few men, and the raids of the sea people were comparatively feeble. I am not suggesting anything political at the present time. I am merely stating a fact when I say that the sea is far better for conveying troops than anything except fifteen or twenty parallel lines of railway.

(3) Both the sea and the railway are going in the future—it may be near or it may be somewhat remote—to be supplemented by the air as a means of locomotion, and when we come to that (as we are talking in Board Columbian epochs, I think I may be allowed to look forward a bit)—when we come to that, a great deal of this geographical distribution must lose its importance, and the successful powers will be those who have the greatest industrial basis. It will not matter whether they are in the center of a continent or on an island. Those people who have the industrial power and the power of invention and of science will be able to defeat all others. I will leave that as a parting suggestion.

NATIONAL GEOGRAPHIC SOCIETY

IT is hoped that all members of the National Geographic Society, when they come to Washington, will visit the home of the Society, Hubbard Memorial Hall, Sixteenth and M streets, and make it as far as possible their headquarters while in the city.

It has been suggested that as there is no established abbreviation for Alaska, Aaa. would make a convenient and distinctive abbreviation. This form would not be confounded with the abbreviation for Alabama. The suggestion is made by William A. Kelly, superintendent of the Industrial Training School, Sitka, Alaska.

GEOCRAPHIC LITERATURE

The Gems of the East. Sixteen Thousand Miles of Research Travel Among Wild and Tame Tribes of Enchanting Islands. By A. Henry Savage Landor. 8vo. Pp. 13 + 567. Profusely illustrated. New York and London: Harper & Brothers. 1904. $4.00.

In his account of 250 days' travel in the Philippines, Mr Landor has given the most complete and accurate description of these beautiful islands, their climate, people, and customs, which has yet been published in popular form.

In following him through his various adventures in the islands, one is occasionally asked to believe that only an Englishman could have escaped with his life from savage, crafty natives, cholera epidemics, storms, and starvation; but, upon the whole, there is apparently little exaggeration, and the story of his trip is unusually entertaining and instructive.

While he probably traveled over little ground which had not been previously covered by American soldiers or prospectors, he, being a keen, trained observer, saw far more than they, and he came in closer touch with the people. To the ethnologist his book is especially valuable, careful attention having been given to the characteristics of each tribe with which he came in contact. Many measurements among the different tribes are given, and the book is well supplied with excellent illustrations.

Mr Landor lays great stress upon the agricultural wealth of the islands and the need of instruction in the best methods of farming. This, he thinks, should take the place of some of the other teaching which the people are receiving in the public schools. He deprecates the teaching of English, while at the same time advocating means of general communication among the different tribes. It is somewhat difficult to see why he should not consider it an advantage to them to have a common tongue. In their dealings with other nations, English would unquestionably be more useful than Spanish, with which language, by the way, less than one-tenth of the people are acquainted.

If any fault can be found with this interesting volume, it is that so little is said about the civilized people of the islands. It is not surprising, however, that Mr Landor devotes most space to the wild tribes, as his travels have generally been among little-known, savage people rather than among the more civilized; but it must be borne in mind that the wild tribes of the Philippines comprise only about one-eleventh of the whole population.

It is to be hoped that Mr Landor's readers will be fortunate enough to meet some of the educated, cultivated Filipinos who are now visiting the United States. They will then appreciate that there are as great differences among the people of the Philippine Islands as between our own educated classes and the wildest Indians of the West.

Mr Landor has many good words for the American army officers and civilians from whom he received much kindness and hospitality, for he is keenly alive to the fact that what the islands need more than anything else (except free trade with the United States) is men of the highest character in both public and private life. The changes which have taken place since American occupation and which are still going on are treated in an impartial manner.

In concluding the 567 pages of his book Mr Landor says: "In some eighteen years of travel I never enjoyed more than I did in this journey over these enchanting islands, really and truly the 'gems of the East.'"

M. C. G.

XUM

Manchuria and Korea. By H. J. Whigham. With map and illustrations. Pp. 245. 6 x 9 inches. New York. Imported by Charles Scribner's Sons. 1904. $2.00 *net.*

This book is the record of a journey through Manchuria made in 1901, and is one of the best of the many accounts of Manchuria that has appeared. Mr Whigham, of course, looks at everything Russian from the English point of view, but nevertheless he shows much appreciation of the order and stability that had been widely introduced in Manchuria, while lamenting the circumstances that had made Russia predominant. He speaks with much admiration of Harbin, particularly of its geographical position at the center of railway and river routes. The city will eventually become the Chicago of the Far East. At the time he visited the city he found it "chiefly remarkable for the number of its generals and its phonographs. The phonographs are imported so freely from America that every house seems to be haunted with an aged crone singing the music of 'El Capitan.' The generals come from St. Petersburg or Moscow by every mail."

The author on one occasion accompanied a Russian expedition sent to escort some junks down the river to Niuchwang. He gives an interesting account of the trip. As many as 5,000 junks attached themselves to the escort and thus reached the city without paying toll to bandits, who exact regular tribute from every junk plying up and down the river.

The boatmen regard the blackmail demanded by the pirates exactly as they regard likiu or any other tax. One robber with a gun appearing on the bank of the river is quite enough to stop fifty boats. In ordinary times the tax levied by the brigands is not very great, or at least not prohibitive, because the whole matter has reached the state of permanent compromise so dearly loved by the Chinese. The brigands have agents in Niuchwang, where the blackmail can be paid in advance at a reduced rate. "In the city there are several hundred rich men dressed in silks and satins, moving in the best Chinese society, who make their living entirely by piracy." A large part of the brigandage had been stopped by the Russians since the author was in Manchuria.

Mr Whigham repeatedly refers to the easy way in which the Russians mingle with the Chinese. Everywhere he saw Russians and Chinamen traveling in the same car, and Russian women and girls at the stations selling bread and drink to the coolies. Foreigners of other nationalities "would no more have thought of traveling on the same truck with Chinese coolies than a Southerner in the United States would think of sitting down to dinner with a negro." It is unfortunate that such an excellent book should be marred by a wretched and entirely inadequate map.

Steps in the Expansion of Our Territory. By O. P. Austin, Chief of the Bureau of Statistics, Secretary of the National Geographic Society, etc. Pp. 258. With many diagrams and maps. New York: D. Appleton & Co. 1903. $1.25.

This little volume summarizes the territorial growth of our country. The story is well told, the main facts being singled out and marshaled in striking manner. Mr Austin aims throughout to show wherein our growth has differed from any expansion in the past and what the main elements of this phenomenal territorial and commercial development have been. A special feature are the many diagrams introduced, illustrating clearly and in detail each step in expansion. The following paragraphs are quoted, the first from the introduction and the second from concluding chapter:

"The process of our national growth has been unique. Nations have usually been constructed by the conquest and

absorption of adjacent territory, by an alliance or consolidation of countries or communities, or by the planting of colonies which have remained subject to the parent country. But the spectacle of thirteen distinct communities uniting in one common organization and voluntarily creating from their unoccupied area other organizations of equal rank and power with themselves, until the newly created members of the family finally exceeded the original in number, in population, and in political power, is an unusual feature in national history."

"We scarcely realize how big we have grown. We proudly compare the growth of our manufacturing or exports with that of the United Kingdom, for example; but do not, apparently, stop to consider that the area of England is less than that of the State of Kansas, and that of the entire United Kingdom less than that of Kansas and Nebraska combined. When we compare our own conditions with those of France, we forget that its area is less than that of our two Territories of Arizona and New Mexico combined. We look with complacency upon the figures which compare our growth in manufactures, commerce, and population with that of Germany, but overlook the fact that all of the German Empire is smaller than our single State of Texas. The area of the thirteen colonies, as defined by the Peace Treaty of 1783, was equal to that of the present United Kingdom, France, Germany, Norway, and Sweden, whose combined population today is 143,000,000. The area added by the Louisiana Purchase is greater than the present area of Spain, Portugal, Italy, Austria, Hungary, and all of the Balkan States, with a combined population of 125,000,000. The area added by the Florida Purchase is more than that of the present Denmark, Netherlands, Belgium, and Switzerland, whose population today is 18,000,000. The combined area of the Texas, Mexican, Oregon, and Alaska additions is nearly equal to that of all European Russia, whose present population is 106,000,000. Thus our present area, including Alaska, may be said to practically equal that of all Europe, whose population in round numbers is 400,000,000 of people."

War Map of Manchuria and Korea. The War Department has issued a new and revised edition of the map of the seat of war in the Far East published by it several months ago and republished as a Supplement to the NATIONAL GEOGRAPHIC MAGAZINE for March. The map has been entirely redrawn, and is on a larger and hence clearer scale than the first edition. As the copies printed of the first edition for the use of the National Geographic Society have long since been exhausted, the Society has arranged for a considerable number of the new edition, which it will sell to applicants at 25 cents per map. The map is extremely useful to those following the armies in the East, inasmuch as it shows clearly all the roads along which the armies are moving.

A Catalogue and Index of the Publications of the Hayden, King, Powell, and Wheeler Surveys has recently been prepared by Mr L. F. Schmeckebier (Bull. No. 222). It is a valuable reference book for the student, investigator, and librarian, as the publications of these early government organizations constitute a storehouse of geographic, geologic, ethnologic, and archæologic information concerning the western portion of the United States.

A water route between the Atlantic Ocean and Lake Chad has been discovered by Captain Lenfant via the Benue and Logone rivers. The journey to Lake Chad via this route takes 69 days as against 155 by the former route by way of the Kongo, Mobongi, and Shari rivers. The new route can be used only during high water—August 1–October 15.—*Scot. Geog. Jour., April.*

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